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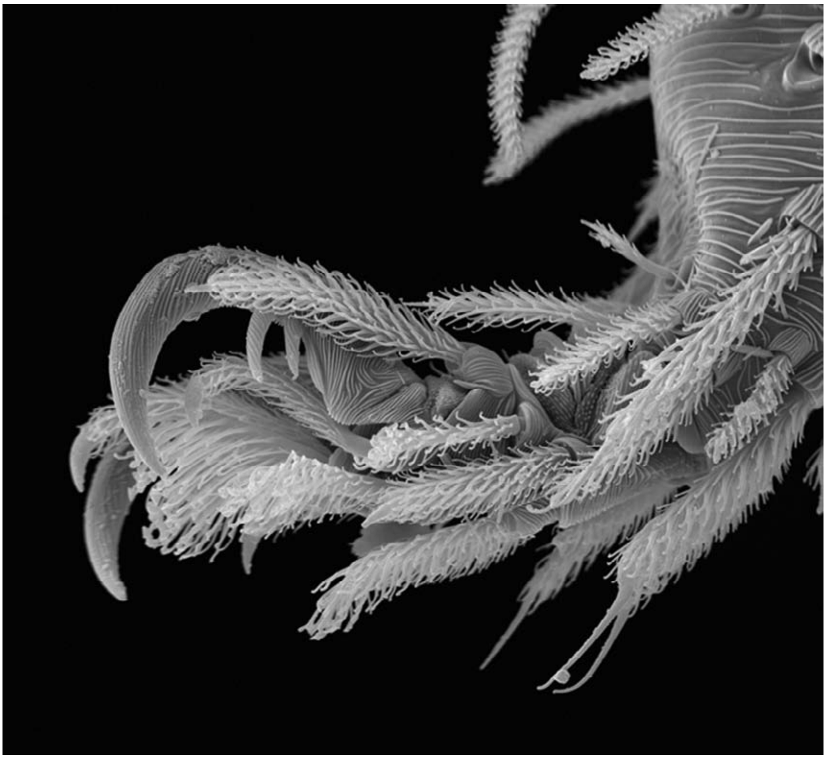

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CONTENTS

Abstract 3
Introduction 3
Materials and Methods 12
Collections Examined 13
Malagiella, New Genus 13
Acknowledgments 84
References 85
Index of Specific Names 86

ABSTRACT

A new oonopid genus endemic to Madagascar, *Malagiella*, is proposed and its 10 constituent species newly described and illustrated: *M. ambalavo* (♀), *M. andringitra* (♂ ♀), *M. fisheri* (♂ ♀), *M. goodmani* (♀), *M. nikina* (♀), *M. ranavalona* (♀), *M. ranomafana* (♂ ♀), *M. toliara* (♂ ♀), *M. valterova* (♂ ♀), and *M. vohiparara* (♂ ♀).

Malagiella is most similar to the Asian genus *Camptoscaphiella* in both somatic and genitalic features, but differs in some important characters. Unlike *Camptoscaphiella*, the *Malagiella* male has a palpal bulb completely fused with the tarsus and a sternum bearing stiff bristles; the female has a round copulatory opening and bifid 4th claws.

The species may be recognized by the genitalia. Male palpi are fairly uniform, but differ in segment proportion and details of the embolus complex, which consists of a broad dorsal embolus connected to a laminar ventral prong. Female genitalia are more variable, especially in the curvature of the receptaculum, which spans the range from nearly straight to widely sinuous and occurs in mirror-image versions having opposite coiling. These torsional variants, with females having either left- or right-handed receptacula, probably occur in all species, although they are not evident in species with straight receptacula and (obviously) unknown in species represented by singleton female specimens.

Malagiella species are very diverse somatically, ranging from dark, big, and large-eyed species to pale, small, and reduced-eyed ones. Our preliminary clustering uses mostly these somatic features, with some genitalic support, to identify three species groups: *ranomafana*, *vohiparara*, and *toliara*. Other genitalic characters that suggest different groupings are discussed.

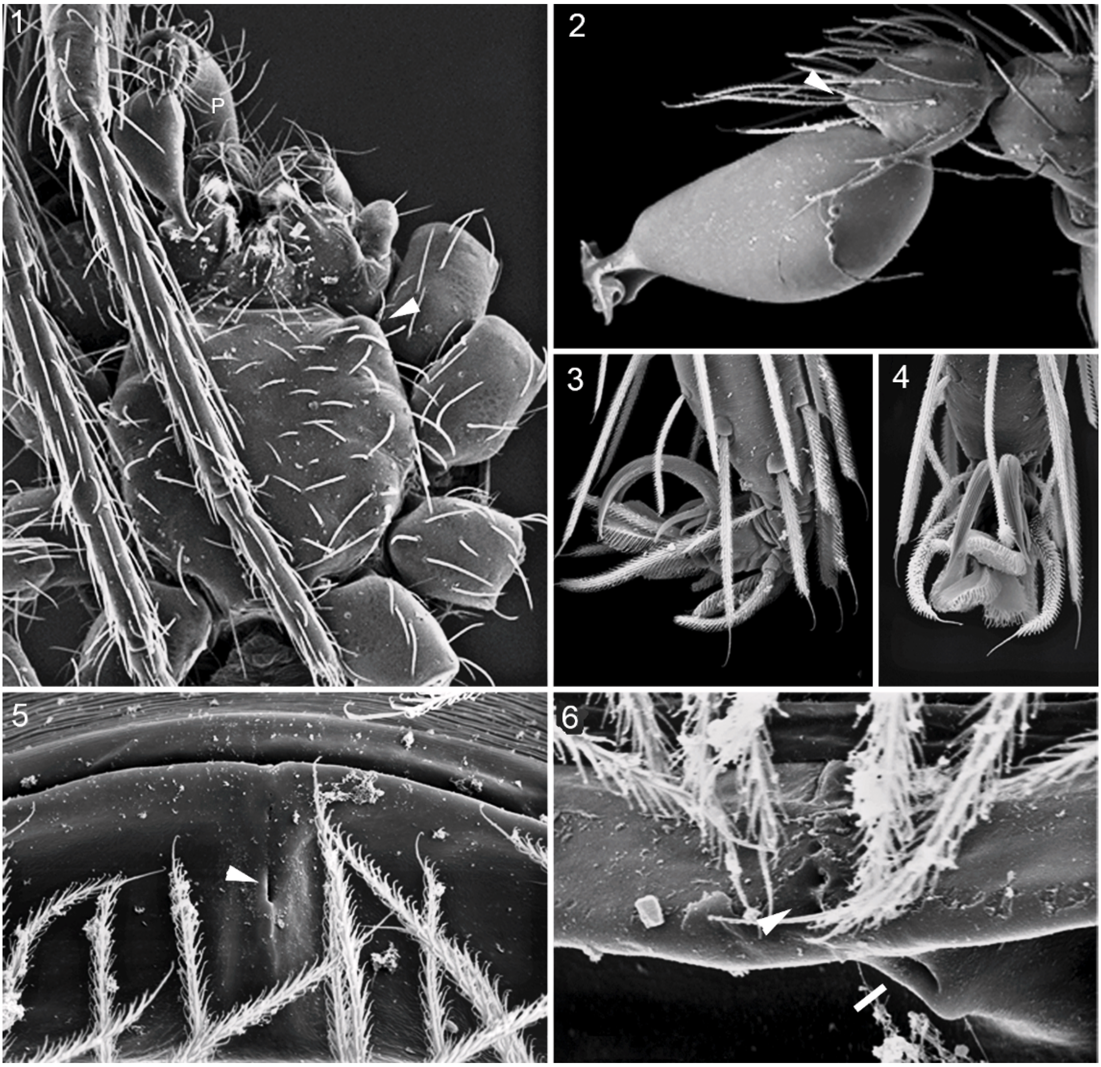
INTRODUCTION

Oonopidae is a worldwide family that currently contains about 500 described species (Platnick, 2010), although the actual number is believed to be much greater. Current estimates, based on the survey of existing collections by the Goblin Spider Planetary Biodiversity Inventory (PBI) project (http://research.amnh.org/oonopidae/index.php), suggest at least 2000 species. That oonopids have been inadequately sampled and studied is not surprising, as they are small, mostly tropical, and largely restricted to cryptozoic habitats, such as forest litter. As it turns out, they may be very abundant and diverse in favorable habitats.

A good example of the untapped diversity of goblin spiders is the fauna of Madagascar. Oonopids were completely unknown from that island until Millot (1948) first mentioned their presence, but that mention was only a brief account and did not record any species. As no subsequent studies followed, the Malagasy oonopids continue to be unknown (Griswold, 2003). However, recent expeditions to Madagascar reveal that this fauna is clearly not depauperate. A sampling of that island's arthropod fauna, through the numerous expeditions of Vincent and Barbara Roth, Mike Irwin, Rinha Harinhala and Evert Schlinger, Brian Fisher and Charles Griswold, and Hannah Wood, Fernando Álvarez Padilla, and Alma Saucedo (NSF grants DEB 9296271, DEB-0613775, DEB-0072713, and EAR-0228699), has turned up vast collections of over 10,000 oonopid specimens, representing roughly 100 species. In this paper, the first in a series of revisions of this fauna, we describe the new genus *Malagiella* and its 10 included species.

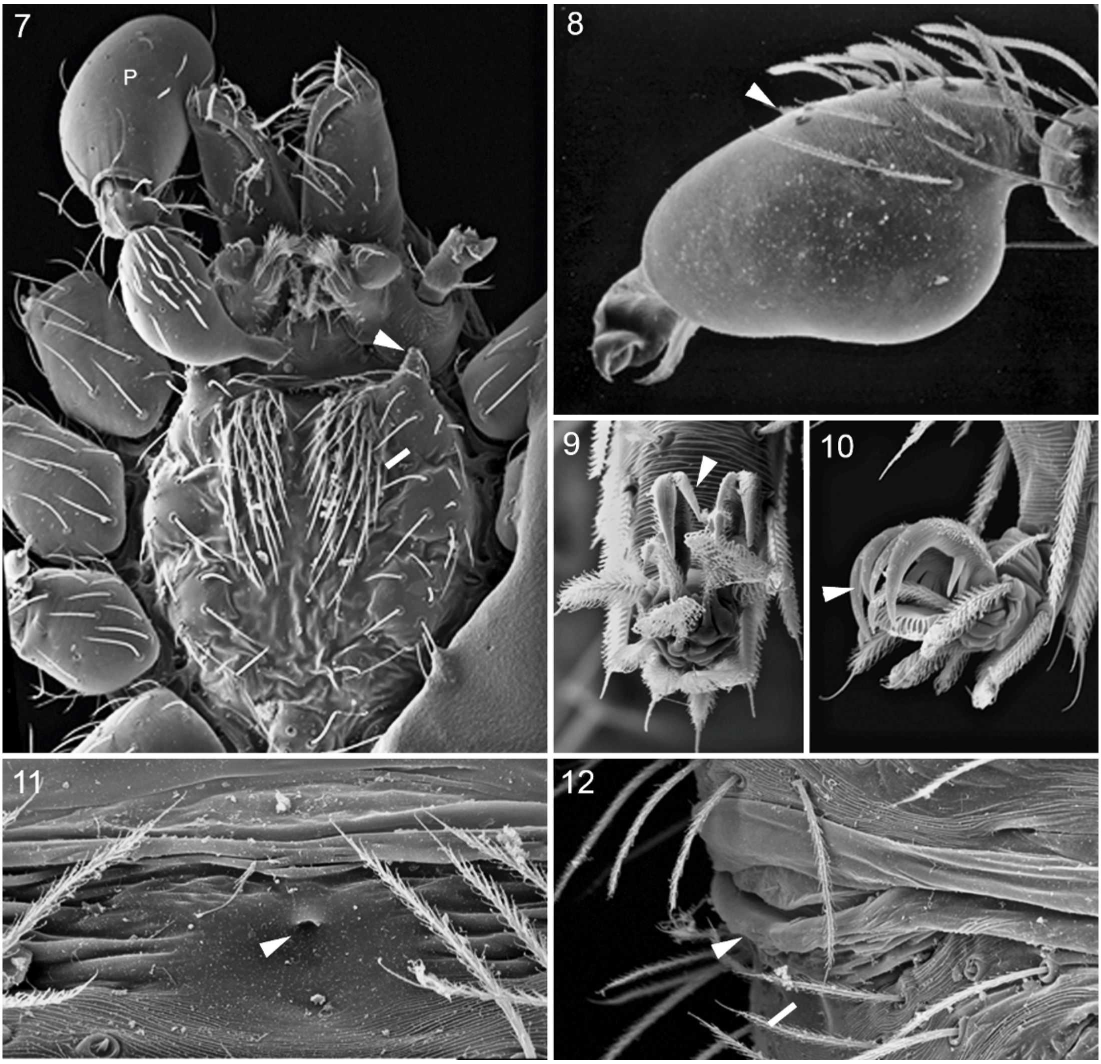
GENERIC PLACEMENT

Easily the most distinctive feature of *Malagiella* is the greatly enlarged palpal patella of the male (figs. 7, 481–486). Although similarly modified palpi are found in *Opopaea* Simon, the two genera are otherwise quite different. Unlike *Opopaea*, *Malagiella* has long and spiny legs (figs. 466–471), eyes contiguous and with convex lenses (figs. 13–18), abdominal scutes slightly (figs. 200–202) to strongly reduced (figs. 440–442), and fundamental differences in both male and female genitalia (see Platnick and Dupérré, 2009a, for details on *Opopaea*).



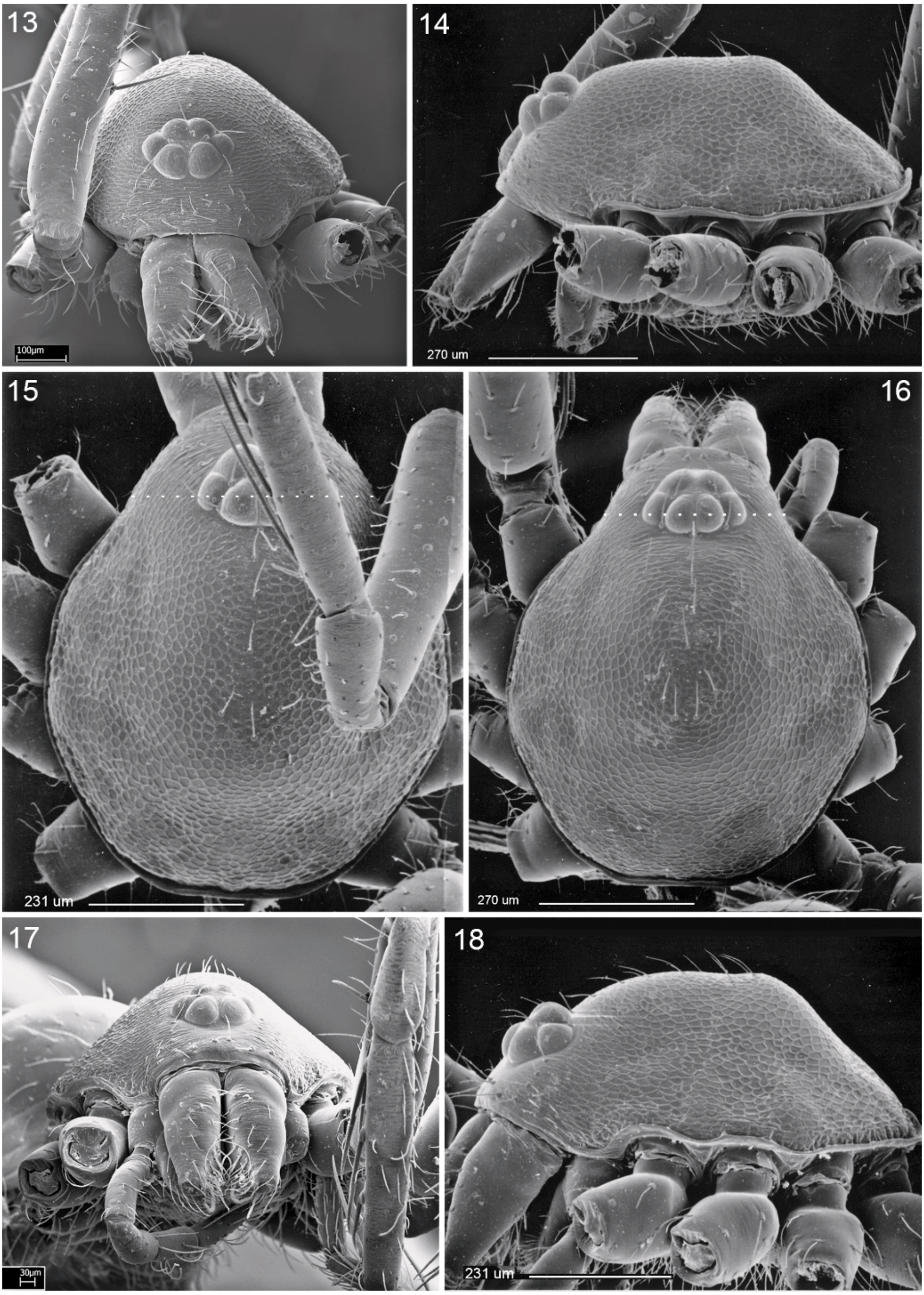
Figs. 1–6. *Camptoscaphiella paquini* Ubick. 1, 2. Male (PBI_OON 02187). 3–6. Female (PBI_OON 03056). **1.** Cephalothorax, ventral view, arrow to anteriolateral knob, P = patella. **2.** Palpal bulb and tarsus, retrolateral view, arrow showing narrow attachment between bulb and tarsus. **3.** Claws of tarsus IV, retrolateral view. **4.** Same, anterior view. **5.** Epigynal margin, posterior view, arrow to copulatory orifice. **6.** Same, anterior view, arrow to median row of pores, dash to copulatory orifice.

In all these characters, *Malagiella* most closely resembles *Camptoscaphiella* Caporiacco (Baehr and Ubick, 2010). In fact, their similarity in both somatic and genitalic features is so striking that it might be argued that only a single genus is here represented. A more detailed examination, however, reveals several differences. The most easily observed are those in the male genitalia and secondary sexual modifications, and the most unambiguous is the difference in the attachment of the palpal bulb to the tarsus. In *Malagiella* the bulb is completely fused to the tarsus (fig. 8), but in *Camptoscaphiella* it is strongly separated (fig. 2), even forming a narrowed “neck” (see also Baehr and Ubick, 2010: figs. 161–181). Interestingly, these differences represent the very extremes of this character transformation. Missing are the intermediate states of bulb free but more broadly attached



Figs. 7–12. *Malagiella ranomafana*, new species. 7, 8. Male (PBI_OON 01999). 9–12. Female (PBI_OON 03227: 9, 10; PBI_OON 03224: 11, 12). **7.** Cephalothorax, ventral view, arrow to anteriolateral knob, dash to sternal bristles, P = patella. **8.** Palpal bulb and tarsus, retrolateral view, arrow showing contact zone of bulb and tarsus. **9.** Claws of fourth tarsus, anterior view, arrow showing large medial prong. **10.** Same, retrolateral view, arrow to medial prongs. **11.** Epigynal margin, posterior view, arrow to copulatory orifice. **12.** Same, anteriolateral view, arrow to posterior margin of gonopore showing absence of median pores, dash to copulatory orifice.

(as in *Heteroonops*, Platnick and Dupérré, 2009b: fig. 385) and bulb fused but retaining full to partial seam (as in *Stenoonops*, Platnick and Dupérré, 2010: fig. 385). The degree of bulb fusion is extremely variable in Oonopidae, but seems to be fairly constant within a genus. The few genera, such as *Oonops* and *Stenoonops*, that presently include species with varying degrees of bulb fusion seem to be polyphyletic assemblages. For example, although the bulb and tarsus are strongly separated in *Oonops tubulatus* Dalmas (see fig. 3 in Machado, 1941) and completely fused in *O. cubanus* Dumitresco and Georgesco (see Dumitresco and Georgesco, 1983: pl. 11, fig. 3), no evidence has


13
100µm
14
270 um
15
231 um
16
270 um
17
30µm
18
231 um

Figs. 13–18. *Malagiella ranomafana*, new species, carapace. **13.** Male (PBI_OON 01999), anterior view. **14.** Same, lateral view. **15.** Same, dorsal view. **16.** Female (PBI_OON 01999), dorsal view. **17.** Same, anterior view. **18.** Same, lateral view. Transverse dotted line shows anterior carapace width measurement.

been presented that these species are actually congeneric. In fact, current ongoing revisions on *Stenoonops* indicate that it is a complex of several genera (Platnick and Dupérré, 2010), and that each is quite uniform in the degree of bulb fusion. Given this trend of intrageneric uniformity, the extreme differences of bulb fusion between species of *Camptoscaphiella* and *Malagiella* strongly argue, on the basis of that very character, that these are distinct genera. However, several other differences were found that support this interpretation to a varying degree.

The two genera also differ in male sternal modifications. The anterolateral margin has a pointed conical process in *Malagiella* (fig. 7), which is smaller and rounded in *Camptoscaphiella* (fig. 1). Also, the sternum in *Malagiella* (except for one species) has a patch of sharp, stiff bristles (fig. 7) that is absent in *Camptoscaphiella* (fig. 1). These bristles are also absent in *M. fisheri* (fig. 305), which is otherwise an unambiguous *Malagiella*, but it is not obvious whether the absence is a plesiomorphy or a derived loss.

Females in the two genera also differ, although by less easily observed features; consequently, they have not been as thoroughly examined. A fundamental difference, although not recorded for many species, is the shape of the external opening (copulatory pore), which is round in *Malagiella* (fig. 11) but a longitudinal slit in *Camptoscaphiella* (fig. 5). Also, the anterior margin of the postepigastric scutum (PES) is unmodified in *Malagiella* (fig. 12, *M. ranomafana* and *M. vohiparara* examined) but bears a row of pores coplanar with the copulatory pore in *Camptoscaphiella* (fig. 6, only *C. paquini* examined). Another difference is the shape of the receptaculum, which is usually straight to slightly curved in most *Camptoscaphiella* but moderately to strongly so in most *Malagiella*. However, exceptions occur in both genera as the most sinuous receptaculum is found in *C. paquini* Ubick (Baehr and Ubick, 2010: figs. 323, 324) and the straightest in *M. goodmani* (figs. 423–429). Also, all female *Malagiella* have free sclerites laterad of the postepigastric scutum (fig. 213), but that are fused to the scutum in at least some *Camptoscaphiella* (as in *C. paquini*, Baehr and Ubick, 2010: fig. 321). Finally, female *Malagiella* have bifid 4th tarsal claw prongs (figs. 9, 10), which are simple in *Camptoscaphiella* (scanned only in *C. paquini*, figs. 3, 4).

Lastly, evidence for the generic distinctness of *Malagiella* and *Camptoscaphiella* comes from a recent, unpublished quantitative analysis of oonopid interrelationships. Utilizing a morphological data matrix extracted from the PBI descriptive database (Álvarez Padilla, Ubick, and Griswold, submitted), augmented by genitalic characters (coded by Alma Saucedo), Fernando Álvarez Padilla, Joel Ledford, and Saucedo performed a parsimony analysis using PAUP 4.0 that showed both *Malagiella* and *Camptoscaphiella* as distinct but related genera (Saucedo, Álvarez Padilla, and Ledford, personal commun.).

HIGHER RELATIONSHIPS

Males of the two genera share an additional character, the fusion of the dorsal and epigastric abdominal scuta. This fusion is complete (seamless) and is found in all *Malagiella* (figs. 31, 32, 142–146, 207, 243, 275, 308, 352, 437) and all but two species of *Camptoscaphiella* (Baehr and Ubick, 2010: figs. 17, 206, 241, 308). Interestingly, this scutal fusion is not restricted to these two genera, but is also found in males of somatically similar, large-eyed, spiny-legged species with reduced scutes. It is present in the widespread genus *Ischnothyreus* Simon. Although apparently overlooked in the many available descriptions, it has been clearly illustrated in some (e.g., Tong and Li, 2008: fig. 4B). Fused scuta have also been recorded from the Asian genus *Aprusia* Simon (Grismado et. al., 2011) and are also known from a few undescribed genera from East Asia and East Africa. Although these taxa are genitalically diverse, the shared secondary sexual character of scutal fusion adds to the value of their somatic similarity in suggesting relationship in an "*Ischnothyreus* complex."

Unfortunately, homoplasy is rampant as male scutal fusion extends beyond the above genera. Some *Neoxyphinus* males have fused scuta (A. Bonaldo, personal commun.), although the fused region is not smooth but represented by a definite seam (see Abrahim et al., submitted: figs. 189, 235, 292, 293).

Complete scutal fusion has been noted in some undescribed genera related to *Gamasomorpha* Karsch (R. Ott, personal commun.), an undescribed species of *Zyngoonops* Benoit (W. Fannes, in prep.), and a new genus from Asia (B. Eichenberger, in prep.). All these spiders, however, differ from *Ischnothyreus* in a number of characters (absence of leg spines, large abdominal scutes, and eye arrangements), suggesting that the scutal fusion in these cases is probably independently derived.

Females of at least some genera of this *Ischnothyreus* complex do seem to share another feature uncommon in oonopids: external copulatory openings that are separate from the uterus externus. This separation of openings for copulation and oviposition is the fundamental definition of entelegynae. The entelegyne condition is rare in haplogynes, but has been reported in several other oonopid genera, such as *Antoonops* Fannes and Jocqué (2008), *Scaphiella* Simon and *Escaphiella* Platnick and Dupérré (Platnick and Dupérré, 2009c), and *Triaeris* Simon (Burger, 2009).

In addition to their presence in *Camptoscaphiella* (figs. 5, 6) and *Malagiella* (figs. 11, 12), external epigynal openings were also reported for *Ischnothyreus* (Baehr and Ubick, 2010: fig. 326). Based on descriptions in the literature, *Ischnothyreus peltifer* Simon seems to have an external copulatory opening located within a posterior atrium (as shown in Dumitresco and Georgesco, 1983: pl. 18: fig. 4). However, a different interpretation was made by Berger who identifies, instead, a series of small openings (slits) located within an anterior atrium and that these slits connect to an internal sinuous gland, rather than to a receptaculum (Burger, in press: fig. 1D).

The male palpi of these genera are different in form and show no obvious similarity. The reduced and strongly sclerotized palp of *Ischnothyreus* (Saaristo, 2001: figs. 146, 147; Dumitresco and Georgesco, 1983: pl. 18) is quite different from the large palp with enlarged patella of *Malagiella* (figs. 85–88) and *Camptoscaphiella* (Baehr and Ubick, 2010: figs. 161–181) as these are from *Aprusia* and the undescribed genera. Despite the gross differences in palpal morphology, it is interesting that in both *Ischnothyreus* and *Malagiella-Camptoscaphiella* the palps require huge muscles to operate, although these are in different locations: in the carapace as opposed to the enlarged palpal patella.

SPECIES GROUPS

The species of *Malagiella* present an interesting combination of characters, where fairly uniformly simple genitalia couple with considerable differences in somatic characters. This creates a problem in that the obvious characters for grouping species seem to be adaptive. Despite the pitfalls of recognizing grades rather than clades, these somatic differences suggest well-defined species groups and, pending a more thorough study of *Malagiella* genitalia (and especially of the unknown males), seem adequate for a preliminary hypothesis.

Malagiella species are of basically two body types: larger, darker species with big eyes (fig. 201) and smaller, pale ones with smaller eyes (fig. 430). Closer inspection shows additional size-related differences, such as carapace reticulation, which ranges from strongly ridged and forming hexagonal cells (figs. 15, 16, 201, 211) to weak with elongate cells (figs. 117, 118, 121, 122, 346, 356) to an apparently complete absence (figs. 430, 441). Another is the size of the abdominal scutes, which may completely cover the abdomen (figs. 201, 211) or show moderate (figs. 346, 356) to very strong reduction (figs. 430, 441).

Size differences in *Malagiella* were explored a bit further in most of the available specimens (56) by measuring the carapace, which shows less intraspecific variation than the abdomen. The resulting plot of carapace width as a function of length is shown in figure 487 and separates the species fairly well. Of the obvious trends, females have both a longer and wider carapace than associated males and carapace length and width vary directly. However, the plot also produces a "hockey stick" graph, in that the smallest species (*M. toliara*) has a carapace longer than would be expected for its width. Differences in scute size are also apparent on the plot, as the female DS is largest in the three largest species (upper right on the plot),

TABLE 1

Comparison of the *Malagiella* species groups Abbreviations are defined in the Materials and Methods section. The character grouping "size" refers to differences that are apparently size related; "?" to those not obviously so; and "genitalic" to characters of the genitalia. Except for the few qualitative differences listed, the number of specimens examined is indicated by "N."

Character	N	*ranomafana* group	*vohiparara* group	*toliara* group
Size	pigmentation	darkest	medium to pale	pale
Body size (mm)	56	1.5–2.0	1.3–1.6	1.1–1.3
♂ car L (mm)	26	0.74–0.83	0.60–0.66	0.60
♀ car L (mm)	30	0.78–0.84	0.61–0.73	0.62
Eye size		large to medium	medium to small	small
Car reticulation		strong	weak to absent	absent
♂ DS/car W	10	0.82–0.95	0.68	0.40
♀ DS/abd W	10	0.5–0.9	0.3–0.5	0.2
♂ VS/abd L	10	0.8–0.9	0.7	0.6
♂ DS-ES junction	30	acute	rounded	rounded
?				
♂ abd H/W	10	1.0	1.25	1.5
Tibia IV ventral spines	26	absent	present	present
Legs III, IV lateral spines	26	absent	absent	present
Genitalia				
♂ Embolus opening size (EO/EG)	3	large (> 1)	small (< 1)	small (< 1)
♂ Bulb with dorsal depression	30	absent, except in *M. andringitra*	present	present
♀ Receptaculum W/L	37	0.3–0.7	0.2–1.2	1.1

smallest in the three smallest species (lower left), and intermediate in the remaining. Eye sizes and body pigmentation similarly show a direct relationship to body size, but have not been quantified.

Figure 487 also shows our clustering of species into groups, which is supported by some additional characters. One is the junction of the fused dorsal scutes in males, which forms a sharp angle in the four largest species (fig. 207), but is rounded (fig. 352) to very obtuse (fig. 437) in the remaining two species represented by males. As the form of the scutal junction depends on scute size, this is also a size-dependent character. Two other characters are not obviously size dependent, although they also correlate with size: The male abdomen is round in cross section in the four largest species (fig. 207) and most strongly higher than wide in the smallest (fig. 437). Leg spine distributions show an even more unexpected pattern in that the smallest species have more spines than the largest. The hind legs of *M. toliara*, the smallest *Malagiella*, have both ventral and lateral spines (fig. 471). The largest species lack spines on the hind legs (fig. 467), whereas those of intermediate size have only ventroapical spines on the hind tibiae (fig. 469).

Using the above somatic differences, three species groups are recognized and compared in table 1. The *ranomafana* group includes large, dark species, with larger eyes, stronger carapace reticulation, largest abdominal scutes, and the absence of spines on the hind legs. The *toliara* group is represented by a single species, the smallest in the genus with the most diminutive structures, but with strongly spiny hind legs. The *vohiparara* group includes intermediate to small species, which have a few small spines on the hind legs.

The species are thus clearly placed in the groups, with some incongruity in the females of *M. andringitra* (figs. 278–280), which are somewhat paler and have a reduced dorsal scutum (DS), and so resemble members of the *vohiparara* group (figs. 355–357). However, the male of *M. andringitra* is readily included in the *ranomafana* group as it has a large DS with an acute scutal junction (figs. 275–277), and is unlike the reduced DS with a rounded scutal junction of male *M. vohiparara* (figs. 347, 352, 353). Despite this similarity, table 1 gives some genitalic characters that suggest a different species arrangement and are discussed below.

Genitalic Characters

Although these species groups are supported by mostly size-related adaptive characters, and run the risk of being merely grades, they also may have some genitalic support. Firstly, the size and position of the embolar opening is a possibility, although so far examined with SEM in only three species. In *M. ranomafana* the opening is large and centrally located (fig. 98), whereas in *M. vohiparara* (fig. 172) and *M. toliara* (fig. 193) it is smaller and in a more prolateral position. Secondly, the size of the sperm pore varies, being clearly larger in *M. toliara* (fig. 432) compared to the other species (figs. 203, 239, 271, 304, 348).

We were unable to find additional genitalic support for the species groups. The male palp differs only slightly among the species. The embolar region shows slight differences in shape and bulb ventral prong (BVP) length, and the palpal segments (primarily the patella and bulb) differ in size (figs. 481–486). But these differences do not suggest obvious groups. In fact, one character suggests an alternate grouping. A slight dorsal depression occurs on the bulb just distad of the tarsus boundary in *M. toliara* (fig. 486) and *M. vohiparara* (fig. 484). Although absent in most species of the *ranomafana* group (figs. 481, 483, 485), it also occurs in *M. andringitra* (fig. 482), suggesting either homoplasy or that the species is misplaced in that group.

The female genitalia are more variable and show differences in the degree of sclerotization, which are not easily quantified, and in the shape of the receptaculum, which varies from being relatively straight to broadly sinuous. The degree of sinuosity, here measured as the ratio of receptacular width to length (map 4), may be used to divide the species into three groups: (1) W/L = 0.2–0.4: *M. andringitra*, *M. nikina*, *M. fisheri*, *M. goodmani*; (2) W/L = 0.4–0.8: *M. ranavalona*, *M. ranomafana*, *M. valterova*; and (3) W/L = 0.9–1.2: *M. vohiparara*, *M. ambalavo*, *M. toliara*. This arrangement, summarized on map 4, is radically different from the one proposed above, since all three groups are now somatically heterogeneous by encompassing both larger and smaller species.

Intraspecific Variation

Although the male genitalia of *Malagiella* are fairly uniform in structure, there is considerable intraspecific variation in the female. This is most evident in *M. ranomafana*, not surprisingly the species represented by the largest series of specimens. Here the receptaculum varies in size and proportion, as well as degree of sinuosity (figs. 228–235). Although this degree of variation may suggest that multiple species are involved, the individuals are from a single region (two sites in Ranomafana National Park) where the variants occur sympatrically. And, as these individuals are otherwise similar in other characters, and no differences were observed in males, it seems that *M. ranomafana* as here defined represents a single species. Lesser differences in receptacular curvature also occur in *M. nikina* (figs. 405–408) and *M. vohiparara* (figs. 375–378).

One unusual variant is the presence of mirror-image differences in receptacular shape. This difference in curvature is not the result of rotation because the receptaculum is rigidly attached to the postepigastric scutum (figs. 182–184). Additionally, the receptaculum is also curved in more than one plane, three-dimensionally, to where a simple rotation would not account for the observed differences. Mirrored variants are shown here for *M. ranomafana* (figs. 230, 231), *M. fisheri* (figs. 327, 328), *M. ranavalona* (figs. 341, 342), *M. vohiparara* (figs. 375, 376), and *M. nikina* (figs. 405–408). Given this trend, it seems likely that this type of variation is common to the genus, and would be expected to occur in the remaining species currently represented mostly by singleton females. Of course, this variation is not apparent in *M. goodmani*, which has a straight receptaculum (figs. 423, 424). Of biological interest is whether these differences in receptacular handedness are reflected in the species' reproductive behavior; do the variants accommodate both right and left palpi equally?

Reproductive System

Male: The two prominent features of the male palp are the greatly enlarged patella and complete fusion of the bulb and cymbium (figs. 85–90, 93–97, 220–227). The embolus complex (E), positioned distally on the bulb, is compressed and retrolaterally concave. It consists of a ventral prong (BVP) and a dorsal embolus (E). The embolus has a retrolateral prong (ERP), which is in line with the BVP, and a prolateral prong (EPP), which along its anterior face has a groove (EG) extending from its tip to the orifice of the embolus (see figs. 93–99).

Female: The female reproductive system in *Malagiella* is externally fairly simple (figs. 100–107, 213, 228–235). The postepigastric scutum (PES) is narrow and reaches only slightly beyond the tracheae. The margins of the gonopore are swollen, glabrous, and smooth, in contrast to the adjacent cuticle. The posterior margin projects outward, forming a concavity that contains a round median orifice. Lateral of the median concavity are two patches of wrinkled cuticle, each bounded posteriorly by a slitlike orifice.

Internally (figs. 108–116, 179–184), the anterior edge of PES has a procurved carina with a deep groove along its posterior margin. Medially from this groove, a sclerotized tube originates and curves into the body cavity, bending posteriorly to about the level of PES. In most of our preparations, a membraneous sac, completely enclosing the tube and attaching to the edge of the carina, survived the digestion process (figs. 111–113). Additional digestion removed most of the sac, except for a distal remnant (figs. 182–184). On either side of the tube, level with the edges of the carina, originates a pair of stout apodemes, which also bend and extend posteriorly to the edge of PES. Given the relative placement of the external median orifice and internal tube, it is apparent that the former represents the copulatory opening and the latter, the receptaculum. The residual membrane must then represent the uterus wall. The paired, slitlike orifices clearly enter the base of the apodemes. A cross section further distad shows only a small, round opening, indicating that a broad slit must be restricted to the apodeme base.

Copulation: Images of the palpal tip and epigynum, in various views but at the same magnifications, were superimposed and examined in Photoshop. From these observations it is apparent that the copulatory opening (CO) is far too small to accommodate even the tip of the embolus. However, it is large enough to admit the tip of its prolateral prong. If this is the mode of insemination, then the embolar groove must function as an insemination tube, with the orifice of the embolus pressed against the adjacent cuticle to avoid losing sperm. The most likely place for this contact is in the median concavity, which in all species is glabrous and smooth. How this is achieved is uncertain, but it seems likely that some sort of stabilizing or anchoring mechanism would be needed. The immediate possibility is the male BVP and female apodeme orifices. Although the prongs (BVP) seem to be of the correct size to fit the orifices, this coupling would place the embolar opening (and the prolateral prong, EPP) far from the CO, unless the embolar complex can expand to accommodate the increased distance. However, the embolar region does not appear flexible and attempts to expand a palp in KOH did not change the relative positions of the embolar structures. A better possibility is that the ventral prong hooks into the gonopore (at the anterior lip of the PES), with the embolus tip resting on the side of the median concavity and the prolateral prong entering the CO. This genitalic orientation, with the male palp oriented 180° from that of the female, suggests a mating position with the male astride the female and the palp hooked over the female abdomen and into the epigynum. This possibility suggests a function to the male sternal bristles as gripping structures, and the palp, with its huge patellar musculature, as a clamping structure.

Sympatry

The species of *Malagiella* are largely allopatric, although this may be an artifact of inadequate collecting, as most of the species are known only from single localities and the range disjunctions suggest artificial gaps. The collections also suggest that the genus is rare, since the roughly 70 specimens sorted represent less than 1% of the total Malagasy oonopids available for study.

Presently, multiple species are known from only two regions, Ranomafana and Andringitra. Ranomafana is by far the most intensely sampled area of Madagascar, at least from the perspective of *Malagiella*, as the six collecting expeditions, totaling about five months of fieldwork, have produced 60% of all specimens. Of the two *Malagiella* species found here, the commonly collected *M. ranomafana* occurs in the Vatoharanana and Talatakely regions. The less common *M. vohiparara* is from a different region of the park, Vohiparara, but with a single collection at Talatakely where it is sympatric with *M. ranomafana*. Based on current collecting records, the two species are not broadly sympatric.

The second region, Andringitra, was much less intensely sampled, having been visited during a single expedition where *Malagiella* were collected on only three days. Despite this difference, three species were collected here, but all at different localities and elevations: *M. andringitra* at 1680 m, *M. ambalavo* at 1275 m, and *M. nikina* at 825 m. Despite their close distributions, these species are currently allopatric.

BIOGEOGRAPHY

The species distributions are plotted on maps 1 to 4. Map 1 plots the species on the current vegetation map of Madagascar. Map 2 arranges the species into our tentative species groups based primarily on size differences. The *ranomafana* group (squares) occupies the easternmost part of the distribution and is parapatric with the *vohiparara* group (circles). The *toliara* group (triangles) is disjunct in the SW part of the island. Thus, the largest species are eastern and the smallest are western and southern.

Map 3 shows the palpi, depicted at the same scale, and arranged geographically. Here *M. andringitra* is grouped with *M. vohiparara* and *M. toliara*, on the basis of the dorsal depression of the palpal bulb. This group, in contrast to the arrangement based on somatic characters, includes a large, medium, and small species, and geographically spans the width of the island. The reduced *ranomafana* group shows a distinct cline of palp size, with the largest southernmost.

Map 4 shows a representative epigynum of each species, also plotted geographically. Of interest is that the distribution, although different from that suggested by our preferred species groups, also has geographic integrity. The least sinuous receptacula occur in the SE corridor, the moderately sinuous to the north, and the most sinuous from eastern central to the southwest. Also interesting is that this latter range corresponds to the area suggested by the palpal bulb depression. The discovery and study of the unknown males of *vohiparara* group is critical for resolving the dilemma of which species grouping is to be preferred.

MATERIALS AND METHODS

Specimens were examined using a LEICA MZ 12.5, MZ16A and Nikon compound microscope. Automontaged images were made using the Leica LAS software. For scanning electron microscopy individuals were dehydrated in 100% ethanol, then critical point dried, sputter coated, and imaged with a LEO 1450 VP SEM or Hitachi S-520 SEM. Female genitalia were examined directly, using clove oil, lactic acid, and/or methyl salycilate, and with the soft tissues digested using pancreatin and lens-cleaning enzyme.

Descriptions were generated with the aid of the PBI descriptive goblin spider database and shortened where possible. Female descriptions include only differences from the male. For leg spination, the segment is divided into thirds and the number of included spines given basal to distal. Only spine-bearing surfaces are listed and are indentified by the abbreviations: p (prolateral), r (retrolateral), d (dorsal) or v (ventral). The localities were mapped using Google Earth and the plates prepared in Adobe Photoshop. The vegetation map of Madagascar is from Du Puy and Moat (2003) and was obtained online from the GIS Unit of the Royal Botanic Gardens, Kew, and used with permission. Measurements are in millimeters, unless indicated otherwise.

Coded numbering systems and databases featured in the paper include the Goblin Spider PBI specimen-level database and California Academy of Sciences Entomology specimen-level database. The former, e.g., PBI_OON plus the respective number, belongs to a database encompassing all specimen lots studied by the participants in the Goblin Spider PBI that represents more than 60,000 specimens from more than a score of institutions. The latter, e.g., CASENT plus the respective number, belongs to a specimen-level database at CAS with numbers assigned to lots for the more than 12,000 goblin spiders. Neither numbering system connotes specimen ownership: that information is contained within the databases. Other codes featured, e.g., BLF plus a number, represent collecting events. Full data are available from the authors upon request.

ABBREVIATIONS

abd	abdomen
ALE	anterior lateral eye(s)
ALS	anterior lateral spinneret(s)
B	bulb
BL	book lung
BLC	book lung cover
BVP	bulb ventral prong
car	carapace
CO	copulatory orifice
DS	dorsal scutum
E	embolus
EG	embolar groove
EPP	embolar prolateral prong
ERP	embolar retrolateral prong
ES	epigastric scutum
F	femur
G	gonopore
H	height
L	length
P	patella
PA	posterior apodeme
PER	posterior eye row
PES	postepigastric scutum
PLE	posterior lateral eye(s)
PLS	posterior lateral spinneret(s)
PME	posterior median eye(s)
PMS	posterior median spinneret(s)
Ta	tarsus
Ti	tibia
TBL	total body length
Tr	trachea
VS	ventral scutum (ES + PES)
W	width

COLLECTIONS EXAMINED

AMNH	American Museum of Natural History, New York
CAS	California Academy of Sciences, San Francisco
FMNH	Field Museum of Natural History, Chicago
MCZ	Museum of Comparative Zoology, Harvard University
NHMB	Natural History Museum, Bern
USNM	National Museum of Natural History, Washington, D.C.

SYSTEMATICS

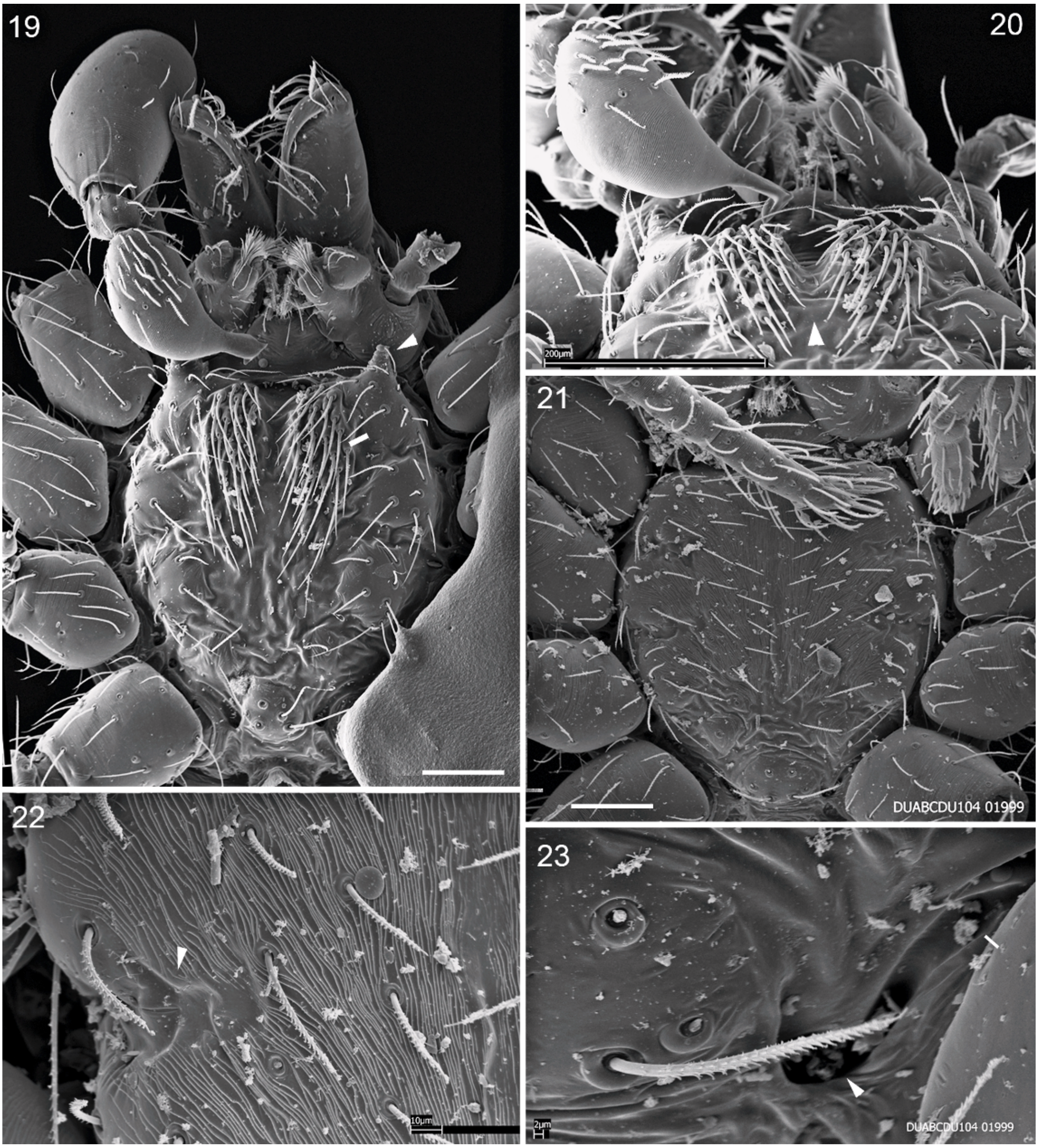
Malagiella, new genus

TYPE SPECIES: *Malagiella ranomafana*, new species.

ETYMOLOGY: The genus name is a contraction of Malagasy *Camptoscaphiella*, and is feminine in gender.

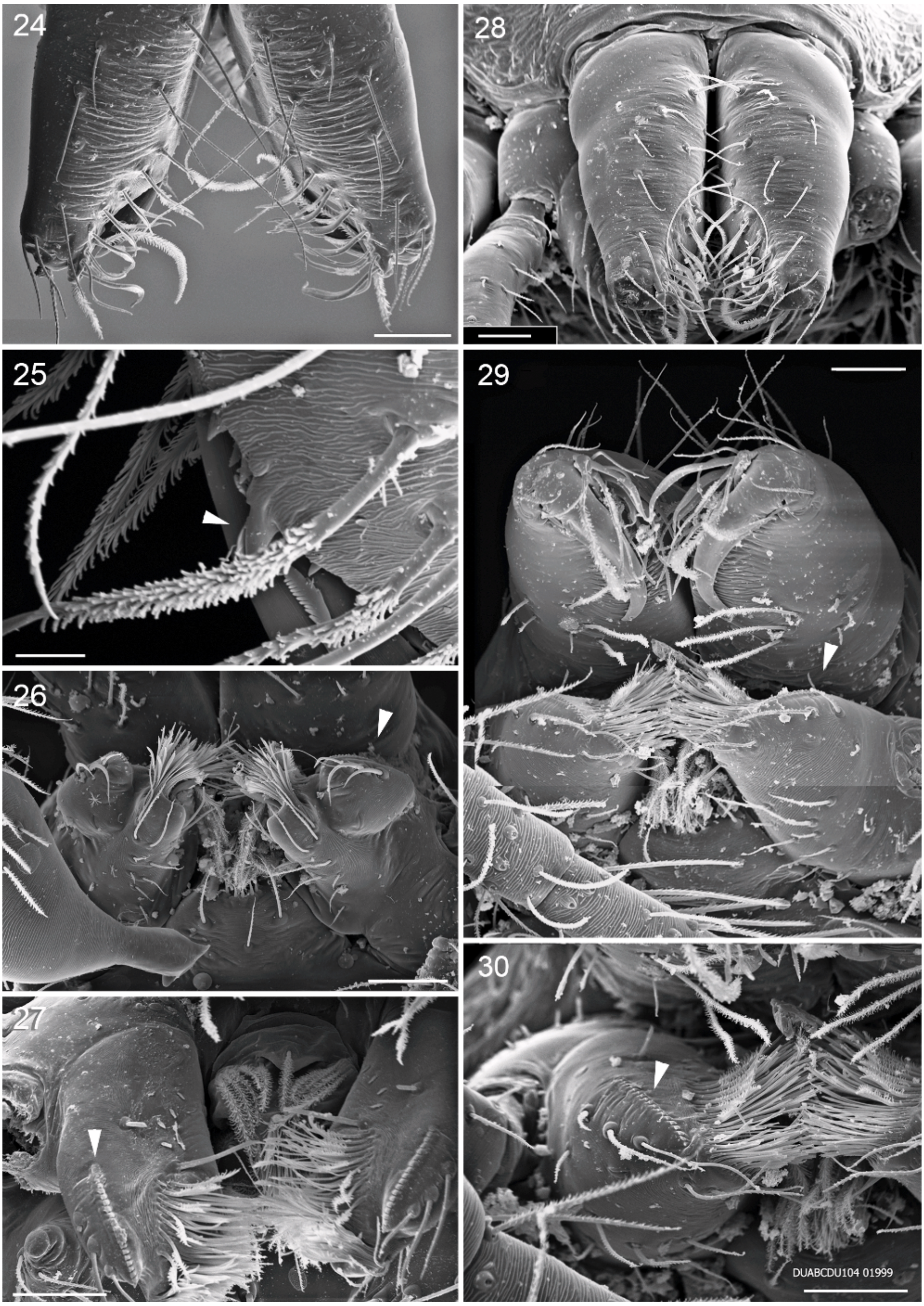
DIAGNOSIS: *Malagiella* differs from other oonopid genera, except *Camptoscaphiella*, by the combined presence of strong leg spines, reduced abdominal scutes, eyes contiguous, palpal patella greatly enlarged in male, and epigynum with single external copulatory opening. Males differ from *Camptoscaphiella* in having the palpal bulb fused to the cymbium (fig. 8) and the sternum with a median patch of stiff bristles (fig. 7, except in *M. fisheri*: figs. 305, 474) and its anterior margins forming pointed cones (figs. 7, 472–477). Females differ in having a round copulatory opening (fig. 11), which is slitlike in *Camptoscaphiella* (fig. 5), and bifid claws of leg 4 (figs. 9, 10), which are simple in *Camptoscaphiella* (figs. 3, 4).

DESCRIPTION: MALE: Total length 1.0–1.7. Color uniform yellow orange (figs. 346, 430) to reddish brown (figs. 201, 269), with carapace and dorsal scute slightly darker than the legs and venter (figs. 270, 395); unsclerotized parts of abdomen pale to white (figs. 202, 347, 431); palpi usually darker than legs (figs. 474, 477). CEPHALOTHORAX: Carapace ovoid (figs. 15, 120, 201, 346) to elongate (fig. 430) in dorsal view, pars cephalica elevation slight (figs. 14, 202) to strong (figs. 117, 347), anteriorly narrowed from 0.53–0.64 times its maximum width (anterior width measured across eye area, as in fig. 15), with rounded posterolateral corners (figs. 201, 346, 430), posterolateral edge without pits, posterior margin not bulging below posterior rim, anterolateral corners without extension or projections, posterolateral surface without spikes; surface and sides of elevated portion of pars cephalica and thoracica with variable sculpturing, strong with reticulation of deep hexagonal cells (figs. 13–15) to weak with shallow and elongate cells (figs. 117–120) to smooth (fig. 430); thorax without depressions, fovea absent, without radiating rows of pits; lateral margin undulate strongly (fig. 202) to slightly (figs. 117, 347, 431), rebordered, without denticles; plumose setae near posterior margin of pars thoracica absent; nonmarginal pars cephalica setae needlelike; nonmarginal pars thoracica setae absent; marginal setae absent. Clypeus weakly rebordered, in front view slightly downcurved at sides (figs. 17, 119), sloping in lateral view; high, as long as eye area length (fig. 14) to twice eye area length (figs. 117, 119); setae present, light, needlelike; median projection absent. Chilum absent. Eyes six, large (fig. 13), medium sized (fig. 119), or small (fig. 430); ALE slightly larger than others, oval, PLE oval, PME squared; posterior eye row procurved in anterior and dorsal views; ALE touching, ALE-PLE touching, PLE-PME touching, PME touching for most of their length. Sternum longer than wide, not fused to carapace; with radial furrows between coxae I–II, II–III, III–IV (figs. 19, 125, 434), radial furrow opposite coxae III absent; cuticle smooth to finely wrinkled (figs. 19, 126), without pits, sickle-shaped structures absent, without posterior hump, posterior margin extending posteriorly beyond anterior edges of coxae IV as single extension; lateral margin with infracoxal grooves, grooves with openings at anterior and posterior ends (fig. 19) or only at posterior ends (fig. 125, of female in fig. 130), distance between coxae approximately equal, extensions of precoxal triangles present; anterior margin with continuous transverse groove, median longitudinal groove strong (fig. 20) or weakly represented (fig. 126); anterolateral margins with conical extensions (figs. 19, 126, 472–477); with two anteromedian patches of long stiff bristles (figs. 19, 125, 472, 473, 475–477) but absent in *M. fisheri* (fig. 474); lateral and posterior setae needlelike, originating from surface, without hair tufts. Chelicerae slightly divergent, anterior face unmodified; promargin with one tooth, retromargin without teeth (figs. 25, 136); fangs without toothlike projections, directed medially, shape normal, without prominent basal process, tip unmodified; setae light, needlelike, densest medially; paturon inner margin with scattered setae, distal region unmodified, posterior surface with three long setae (figs. 19, 135), promargin with row of flattened setae, inner margin with very long setae (figs. 24, 133), laminate groove absent. Labium triangular, anterior margin indented at middle; with six or more setae on anterior margin, subdistal portion with unmodified setae (figs. 26, 127); not fused to sternum, same as sternum in sclerotization. Endites distally excavated, serrula present in single row (figs. 27, 128); distomedian part with projection bearing dense scopula, distolateral part with swelling bearing serrula and three stout setae; posteromedian part unmodified (figs. 26, 27, 127, 128). ABDOMEN: Ovoid (figs. 201, 237, 269, 302) or cylindrical (figs. 346, 433), without long posterior extension, rounded posteriorly, interscutal membrane without rows of small sclerotized platelets. Book lung covers large, ovoid (figs. 207, 208, 352, 353, 438), without setae, anterolateral edge unmodified. Posterior spiracles not connected by groove (figs. 34, 147). Pedicel tube short (figs. 142, 353, 438) to medium length (figs. 31, 208, 309), scutum extending far dorsal of pedicel from about one (figs. 31, 208, 309) to almost two (figs. 142, 353, 438) pedicel diameters, scuto-pedicel region unmodified, plumose hairs absent, matted setae on anterior ventral abdomen in pedicel area absent, cuticular outgrowths near pedicel absent. Dorsal scutum without color pattern, covering abdomen completely

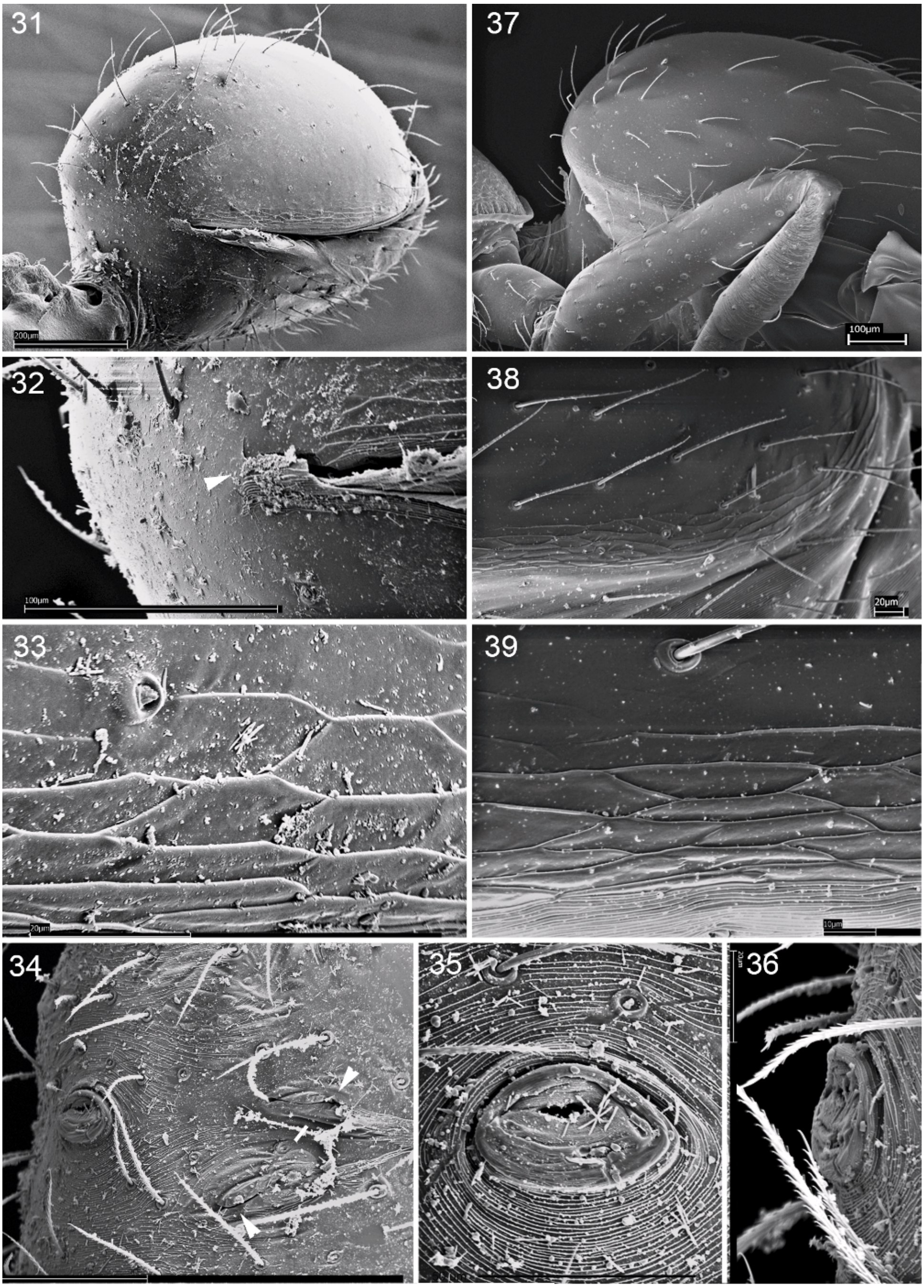


Figs. 19–23. *Malagiella ranomafana*, new species, sternum. **19.** Male (PBI_OON 01999), cephalothorax, ventral view, arrow to anterolateral knob of sternum, dash to sternal bristles. **20.** Same, sternum, posterior view showing glabrous median channel (arrow). **21.** Female (PBI_OON 01999), sternum, ventral view. **22.** Same, sternal groove (arrow) at right coxae II and III. **23.** Same, coxal groove showing pores: dash to anterior, arrow to posterior pore. Scale bars are 100 µm in figures 19 and 21.

(figs. 201, 202) or partially (figs. 346, 347, 430, 431); fused to epigastric scutum (figs. 31, 32, 142–146, 207, 208, 243, 275, 308, 352, 353, 437, 438), forming acute (fig. 207) or obtuse (figs. 352, 438) angle; anterior half without projecting denticles; middle surface smooth, sides smooth. Epigastric scutum strongly (figs. 207, 208) or weakly (figs. 437, 438) sclerotized, surrounding pedicel, not protruding, small lateral sclerites absent. Postepigastric



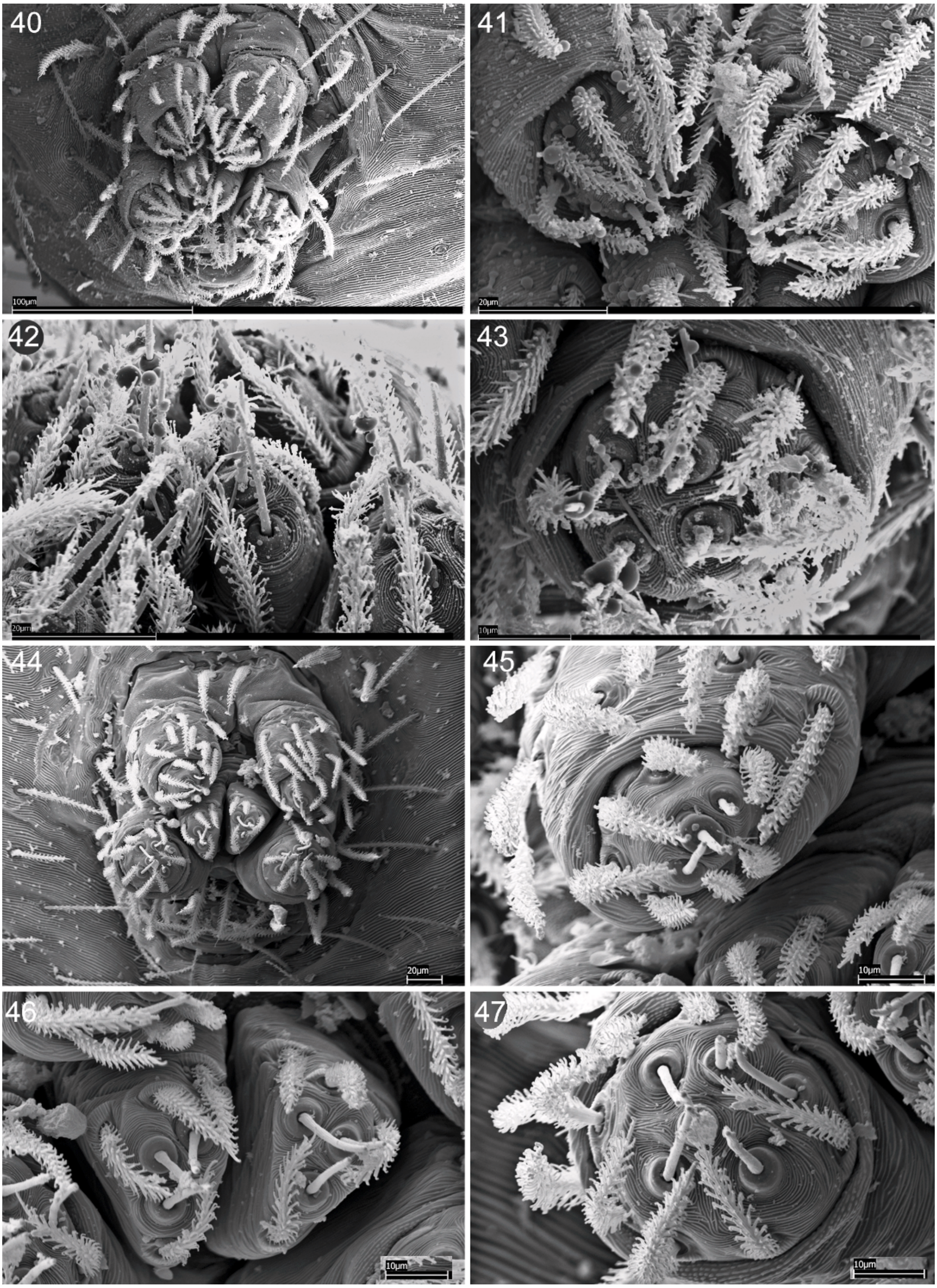
Figs. 24–30. *Malagiella ranomafana*, new species, chelicerae and mouthparts. **24.** Male (PBI_OON 01999), chelicerae, dorsal view. **25.** Same, magnified view showing promarginal tooth (arrow). **26.** Same, endites, apical view, arrow to distolateral swelling. **27.** Same, dorsal view showing serrula (arrow). **28.** Female (PBI_OON 01999), chelicerae, anterior view. **29.** Same, chelicerae and mouthparts, apical view, arrow to unmodified distolateral margin. **30.** Same, endite, anteriodistal view showing serrula (arrow). Scale bars are 10 μm (fig. 25) and 50 μm (others).



Figs. 31–39. *Malagiella ranomafana*, new species, abdomen. **31.** Male (PBI_OON 01999), abdomen, anteriolateral view. **32.** Same, magnified view showing junction of dorsal and ventral scutes (arrows). **33.** Same, magnified view of dorsal scute cuticle. **34.** Same, epigastric region, ventrolateral view showing respiratory spiracles (arrows) and apodeme orifice (dash). **35.** Same, sperm pore, ventral view. **36.** Same, lateral view. **37.** Female (PBI_OON 01999), abdomen, lateral view. **38.** Same, anterior view. **39.** Same, magnified view of ventral view of dorsal scutum.

scutum usually strongly sclerotized (fig. 208), rarely weakly (fig. 438); long, covering most of epigastric area (figs. 203, 348), or short (fig. 432); fusedto epigastric scutum, anterior margin unmodified, without posteriorly directed lateral apodemes. Abdominal setae uniform, light, needlelike; present on dorsal scutum, epigastric scutum, postepigastric scutum, and interscutal membrane; dense patch of setae anterior to spinnerets present, may be weak. Spinneret scutum present, incomplete ring with fringe of needlelike setae; supraanal scutum absent. Spinnerets (scanned in *M. ranomafana*, fig. 40, and *M. vohiparara*, fig. 149): ALS with three spigots (figs. 41, 150), PMS with two spigots (figs. 42, 151), PLS with four spigots in *M. ranomafana* (fig. 43) and three spigots in *M. vohiparara* (fig. 152). Colulus represented only by setae. LEGS: Without color pattern; femur IV not thickened, same size as femora I–III; patella plus tibia I longer than carapace, tibia I unmodified; tibia IV ventral scopula absent, specialized hairs on ventral apex absent; metatarsi I, II mesoapical comb absent, metatarsi III, IV weak ventral scopula absent. Leg spines present, longer than segment width, typical pattern: femur I p0-1-0; tibiae I, II v4-4-0; metatarsi I, II v2-2-0; additional spines in *M. vohiparara* and *M. toliara*: tibia IV v0-0-2 (apical spines); and in *M. toliara*: metatarsus III p0-1-0, r0-1-0, metatarsus IV, tibia IV p1-1-0, r1-1-0. Tarsi I–IV superior claws examined in detail (in *M. ranomafana*); tarsal proclaws and retroclaws with faces striate; tarsi I, II superior claws with three large teeth on lateral surfaces and three small teeth on median surfaces of both proclaw and retroclaw (figs. 74–76); tarsi III, IV superior claws with three teeth on lateral surfaces of proclaw and retroclaw, lacking teeth on median surfaces (figs. 77, 78); tarsal claws I–IV lacking inferior claw (figs. 74–78); tarsal claws III, IV each with three modified clawlike setae (figs. 77, 78). Trichobothria: tibia, each with three; metatarsus, each with one; trichobothrial base longitudinally narrowed, aperture internal texture not gratelike, hood covered by numerous low, closely spaced ridges (figs. 62–64), ridges usually transversely arranged, but radially in one of the two distalmost tibial trichobothria (fig. 63). Tarsal organ with 2 sensillae on palp and tarsi III, IV (figs. 57, 60, 61); 3 sensilla on tarsi I, II (figs. 58, 59). GENITALIA: Epigastric region with sperm pore large, oval, rebordered, situated between anterior and posterior spiracles (figs. 34–36, 148, 432); furrow without Ω-shaped insertions, without setae. Palp normal size, not strongly sclerotized (burnt); right and left palps symmetrical; embolus dark, prolateral excavation absent; trochanter normal size, unmodified; femur normal size, without posteriorly rounded lateral dilation, attaching to patella medially; patella greatly enlarged, three to five times femur length (figs. 481–486), without prolateral row of ridges, setae unmodified; tibia shorter than patella, tibia not enlarged, trichobothria not examined; cymbium ovoid in dorsal view, completely fused with bulb, no seam visible, not extending beyond distal tip of bulb, plumose setae absent, without stout setae, without distal patch of setae; bulb tapering apically.

FEMALE: Total length 1.3–1.9. Color as in male, but abdomen paler because of more exposed membrane (figs. 212, 357, 440–442) and palpi no darker than legs (figs. 478–480). CEPHALOTHORAX: Carapace as in male, but pars cephalica less strongly elevated (figs. 18, 212, 121, 357, 442) and narrower, anteriorly narrowed from 0.49–0.41 times its maximum width. Clypeus lower than in male (figs. 18, 121). Sternum as in male but anterior margin without transverse groove (figs. 21, 129), surface smoother and lacking median longitudinal groove; anterolateral margin unmodified, lacking conical extensions; anteromedian patch of strong bristles absent; setae unmodified, evenly scattered (figs. 21, 130). Chelicerae (figs. 28, 29) as in male. Labium (figs. 29, 132) as in male. Endites distally not excavated, without median or lateral modifications, three setae near serrula slender, not stout (figs. 29, 30, 132). Female palp lacking claw or spines; tarsus unmodified; tibia with three trichobothria; patella without prolateral row of ridges (figs. 48–50, 463–465). ABDOMEN: Ovoid (figs. 211, 356) or cylindrical (fig. 441). Book lung covers (figs. 217, 218, 386, 447) as in male. Pedicel tube, as in male, either short (figs. 337, 363, 448) or of medium length (figs. 218, 319); scutum dorsal extension shorter than in male, from 0.2 to 0.6 pedicel diameters (figs. 116, 336, 362, 386, 400, 447)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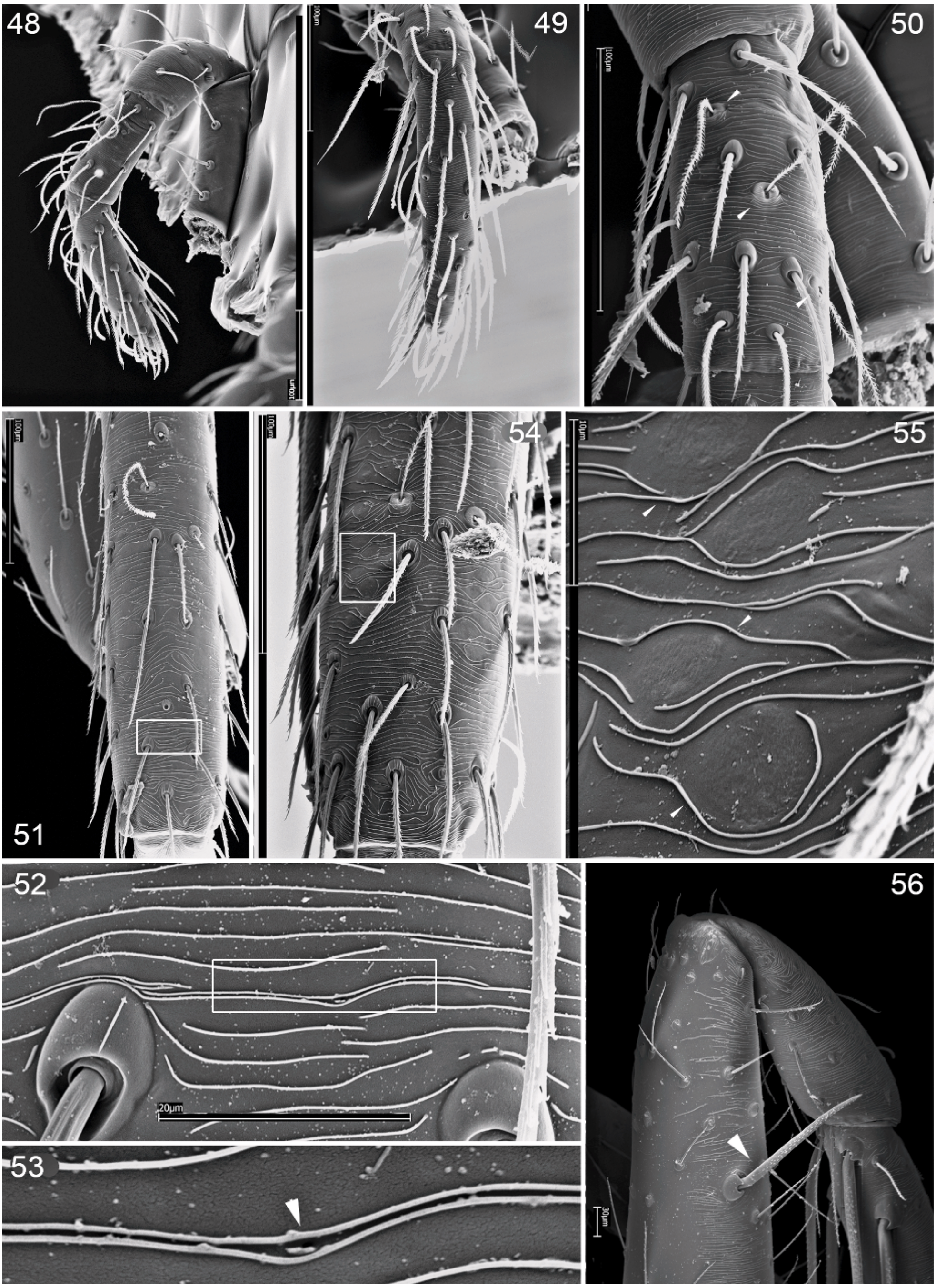
Figs. 40–47. *Malagiella ranomafana*, new species, spinnerets. **40.** Male (PBI_OON 01999), spinnerets, apical view. **41.** Same, ALS. **42.** Same, PMS. **43.** Same, PLS. **44.** Female (PBI_OON 01999), spinnerets, apical view. **45.** Same, ALS. **46.** Same, PMS. **47.** Same, PLS.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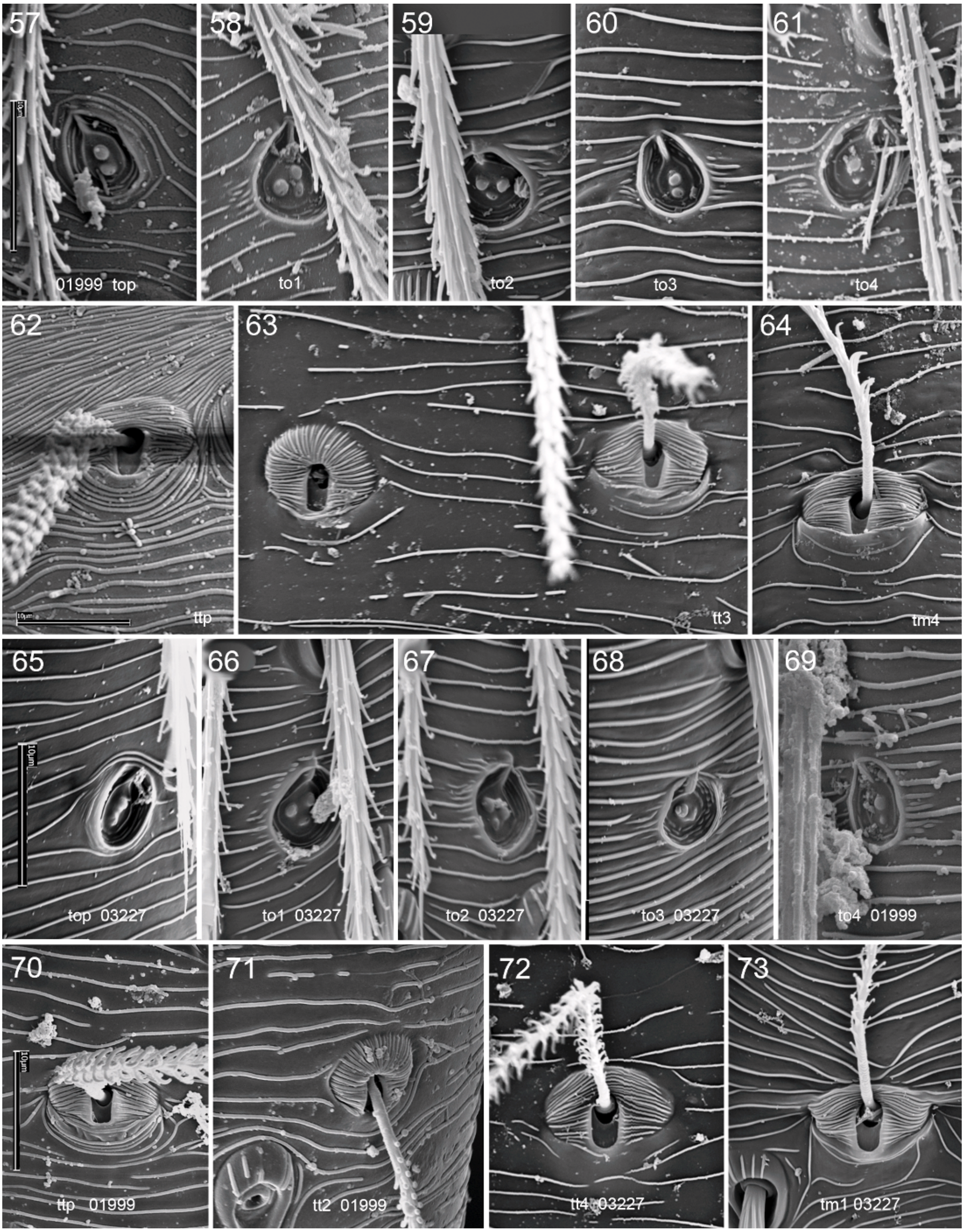
Figs. 48–56. *Malagiella ranomafana*, new species, female (PBI_OON 03227, except fig. 56 = PBI_OON 01999). **48.** Palp, retrolateral view. **49.** Same, anterior view. **50.** Palpal tibia, dorsal view, showing trichobothria (arrows). **51.** Tibia IV, dorsal view. **52.** Same, enlargement of slit sensillum. **53.** Same, further enlargement, arrow shows pore. **54.** Tibia I, dorsal view. **55.** Same, enlargement showing cuticular ornamentation presumably associated with internal muscle attachment (arrows). **56.** Femur I, prolateral view showing spine (arrow).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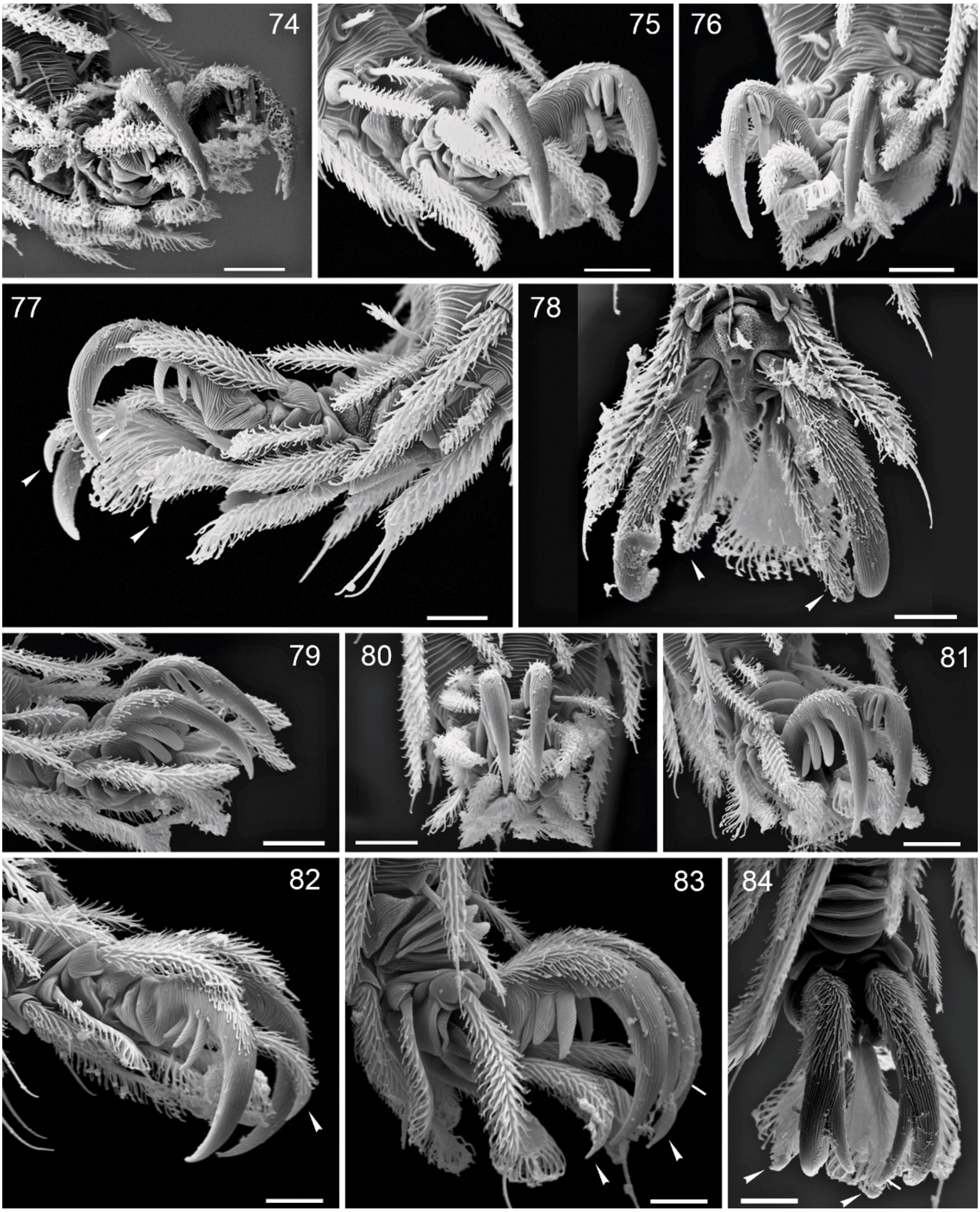
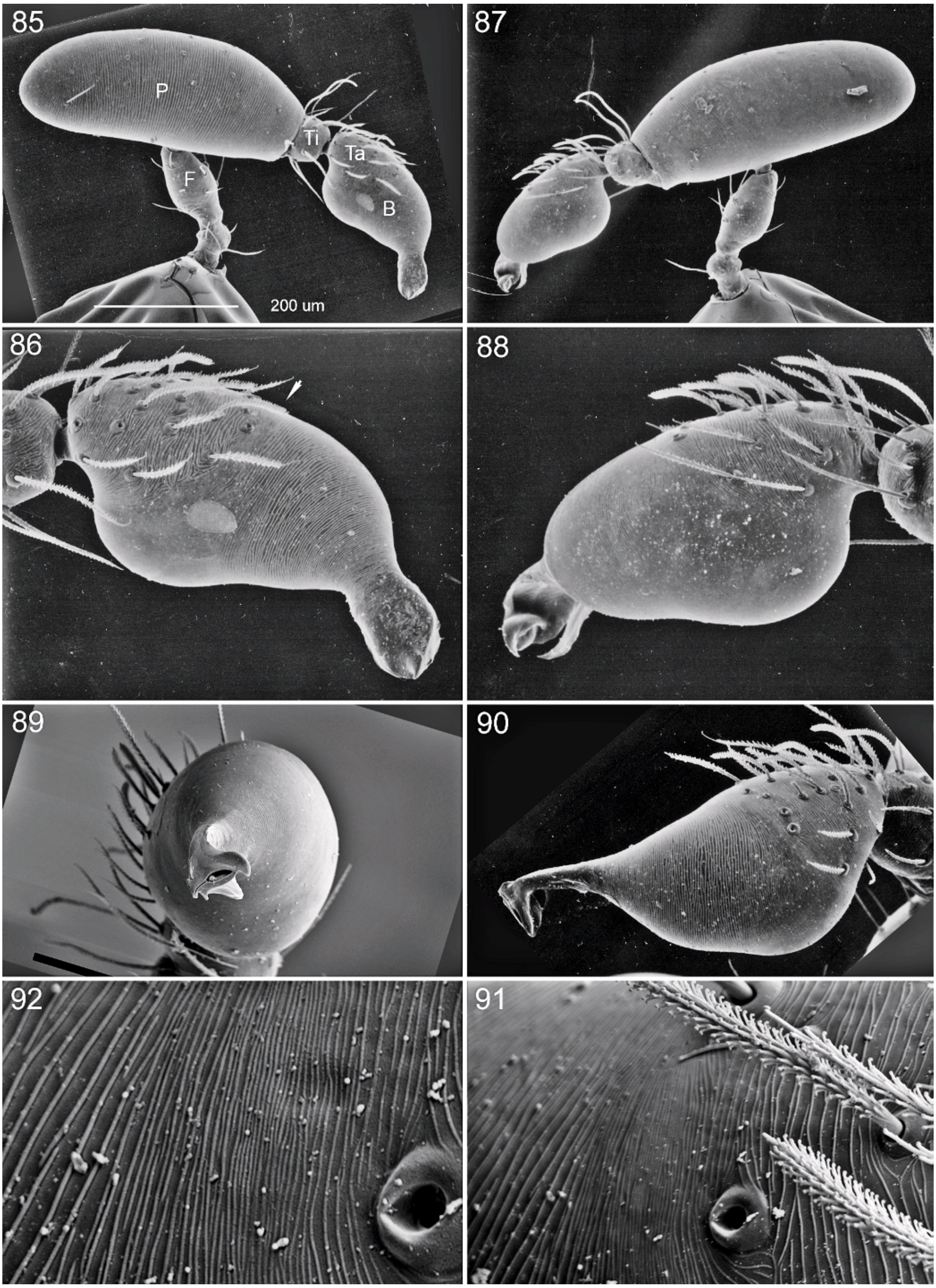
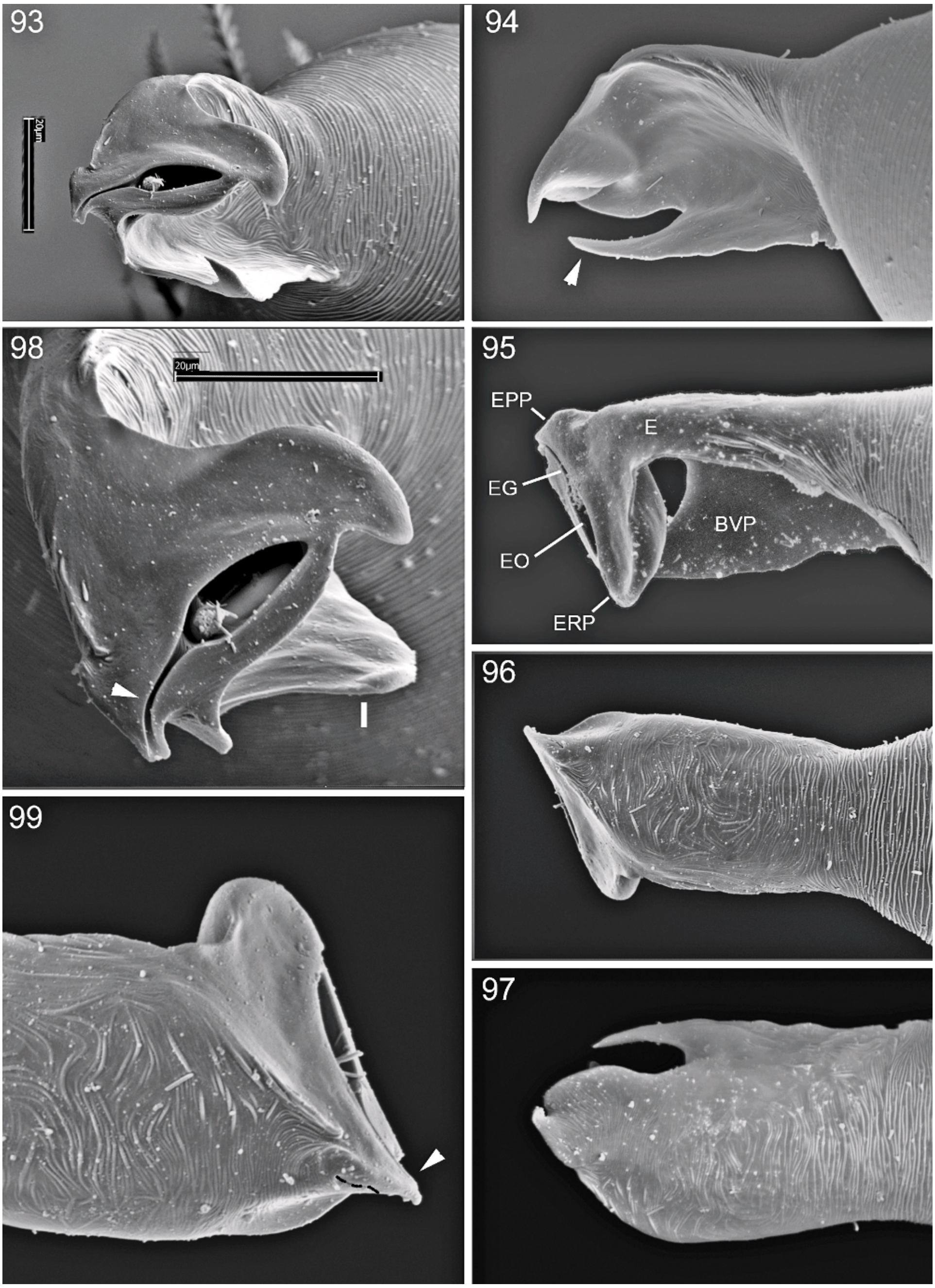
Figs. 57–73. *Malagiella ranomafana*, new species, sensory structures, dorsal view. **57.** Male (PBI_OON 01999), tarsal organ, palp. **58.** Same, tarsus I. **59.** Same, tarsus II. **60.** Same, tarsus III. **61.** Same, tarsus IV. **62.** Trichobothrium, palpal tibia. **63.** Same, tibia III. **64.** Same, metatarsus IV. **65.** Female (PBI_OON 01999, PBI_OON 03227), tarsal organ, palp. **66.** Same, tarsus I. **67.** Same, tarsus II. **68.** Same, tarsus III. **69.** Same, tarsus IV. **70.** Trichobothrium, palpal tibia. **71.** Same, tibia II. **72.** Same, tibia IV. **73.** Same, metatarsus I. Scale bars refer to entire row of figures.



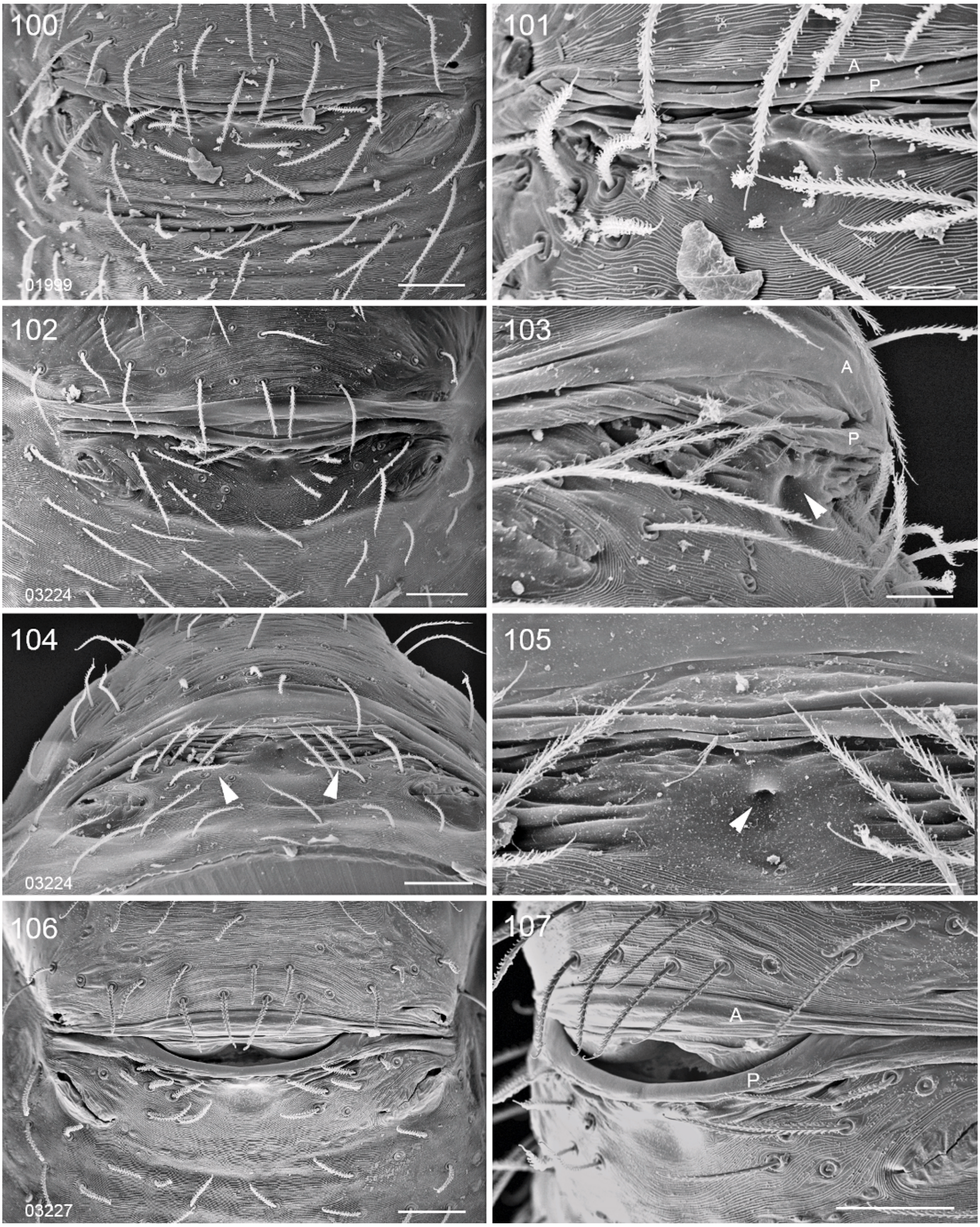
Figs. 74–84. *Malagiella ranomafana*, new species, tarsal claws. **74.** Male (PBI_OON 01999), claw I, apicolateral view. **75.** Same, claw II. **76.** Same, apical view. **77.** Same, claw III, retrolateral view. **78.** Same, claw IV, dorsal view. **79.** Female (PBI_OON 03227), claw I, prolateral view. **80.** Same, apical view. **81.** Same, claw II, apicolateral view. **82.** Same, claw III, prolateral view. **83.** Same, claw IV, prolateral view. **84.** Same, dorsal view. Arrows show clawlike setae and dashes show the enlarged inner tooth in the female. Scale bars are 10 um.



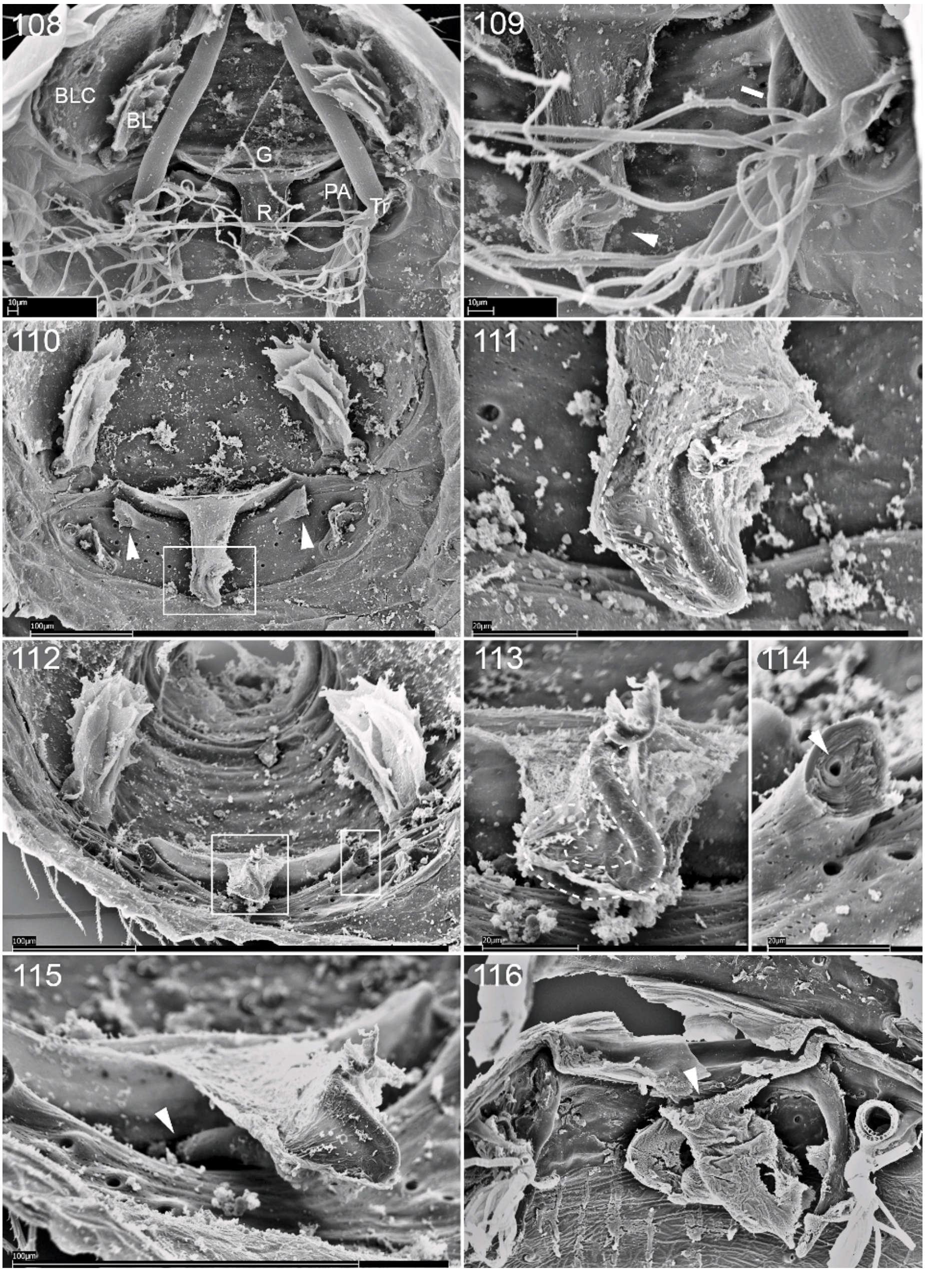
Figs. 85–92. *Malagiella ranomafana*, new species, male palp (PBI_OON 01999), trochanter to bulb. **85.** Prolateral view. **86.** Same, magnified view with arrow showing cymbium-tarsus boundary. **87.** Retrolateral view. **88.** Same, bulb and tarsus. **89.** Bulb, apical view. **90.** Same, dorsal view. **91.** Same, tarsus-bulb boundary. **92.** Same, magnified view. B = bulb, F = femur, P = patella, Ta = tarsus, Ti = tibia.



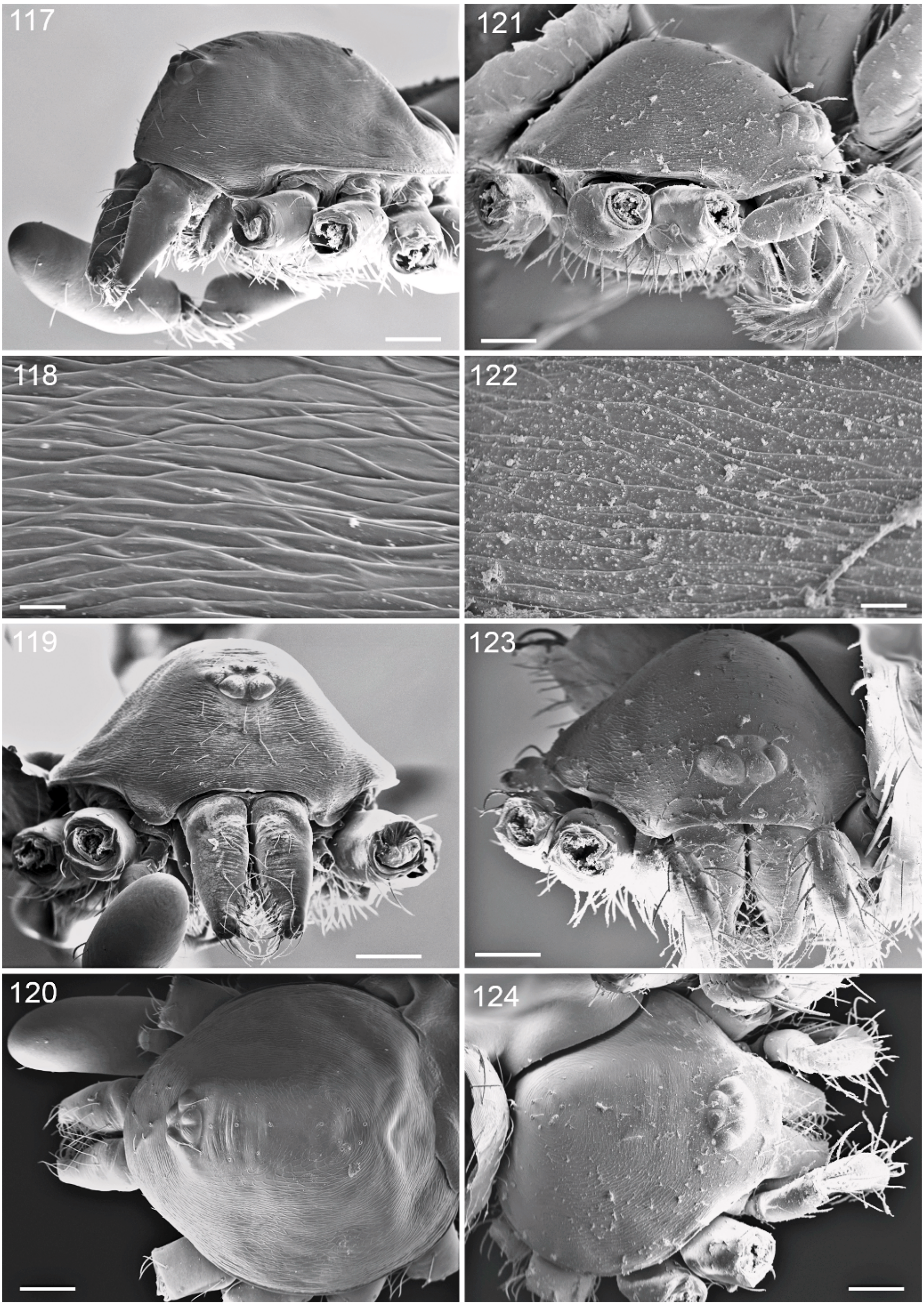
Figs. 93–99. *Malagiella ranomafana*, new species, male palp (PBI_OON 01999). **93.** Embolar region, apical view. **94.** Same, retrolateral view, with arrow to ventral prong (BVP). **95.** Same, dorsal view. **96.** Same, dorsoprolateral view. **97.** Same, prolateral view. **98.** Same, apical view, arrow to groove connecting embolar opening to prolateral process, dash indicates tip of ventral prong. **99.** Same, dorsoapical view, showing groove and prolateral process (arrow). BVP = bulb ventral prong, E = embolus, EG = embolus groove, EO = embolus opening, EPP = embolus prolateral process, ERP = embolus retrolateral process.



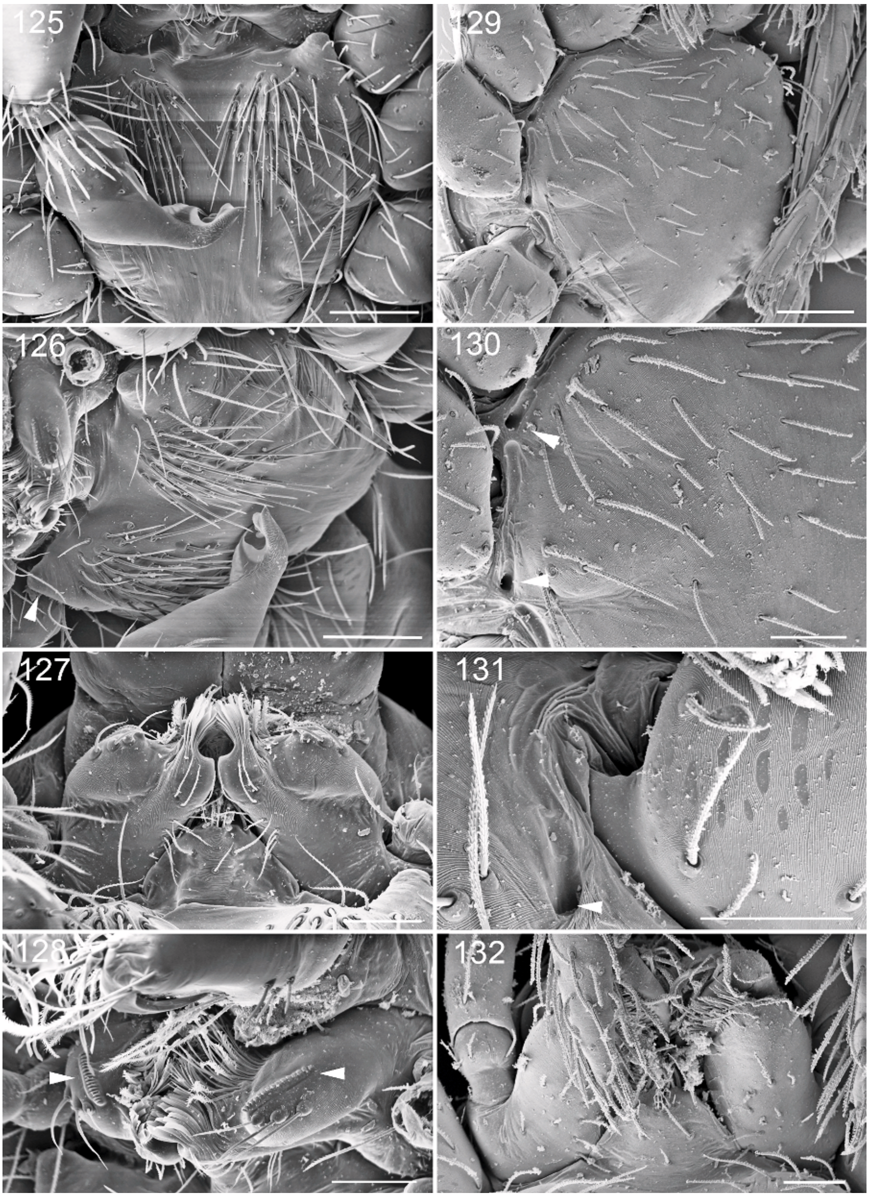
Figs. 100–107. *Malagiella ranomafana*, new species, female epigyna. **100.** Female (PBI_OON 01999), with gonopore closed, ventral view. **101.** Same, magnified view. **102.** Female (PBI_OON 03224), with gonopore slightly opened. **103.** Same, sublateral view, arrow to copulatory opening. **104.** Same, posterior view, with arrows to apodeme orifice. **105.** Same, magnified view, showing copulatory opening (arrow). **106.** Female (PBI_OON 03227), with gonopore moderately opened. **107.** Same, sublateral view. Lettering refers to the anterior (A) and posterior (P) margins of the gonopore. Scale bars are 50 μm (figs. 100, 102, 104, 106, 107) and 20 μm (figs. 101, 103, 105).



Figs. 108–116. *Malagiella ranomafana*, new species, female epigyna, internal views (PBI_OON 03224, except fig. 116 = PBI_OON 03227). **108.** Abdominal region with tracheae, ventral view. **109.** Same, showing receptaculum (arrow) and apodeme (dash). **110.** Same, with tracheae removed, arrows to apodeme bases. **111.** Same, showing receptacular membrane enclosing sinuous duct (dashed line). **112.** Same, posterior view, receptaculum in center box, apodeme base in right box. **113.** Same, showing receptaculum (dashed line). **114.** Same, broken apodeme showing central pore (arrow). **115.** Epigynal region, posterolateral view, showing attachment of receptaculum (arrow). **116.** Same, more thoroughly digested specimen, anterior view, arrow showing torn membrane of uterus internus. BL = book lung, BLC = book lung cover, G = gonopore, PA = posterior apodeme, R = receptaculum, Tr = trachea.

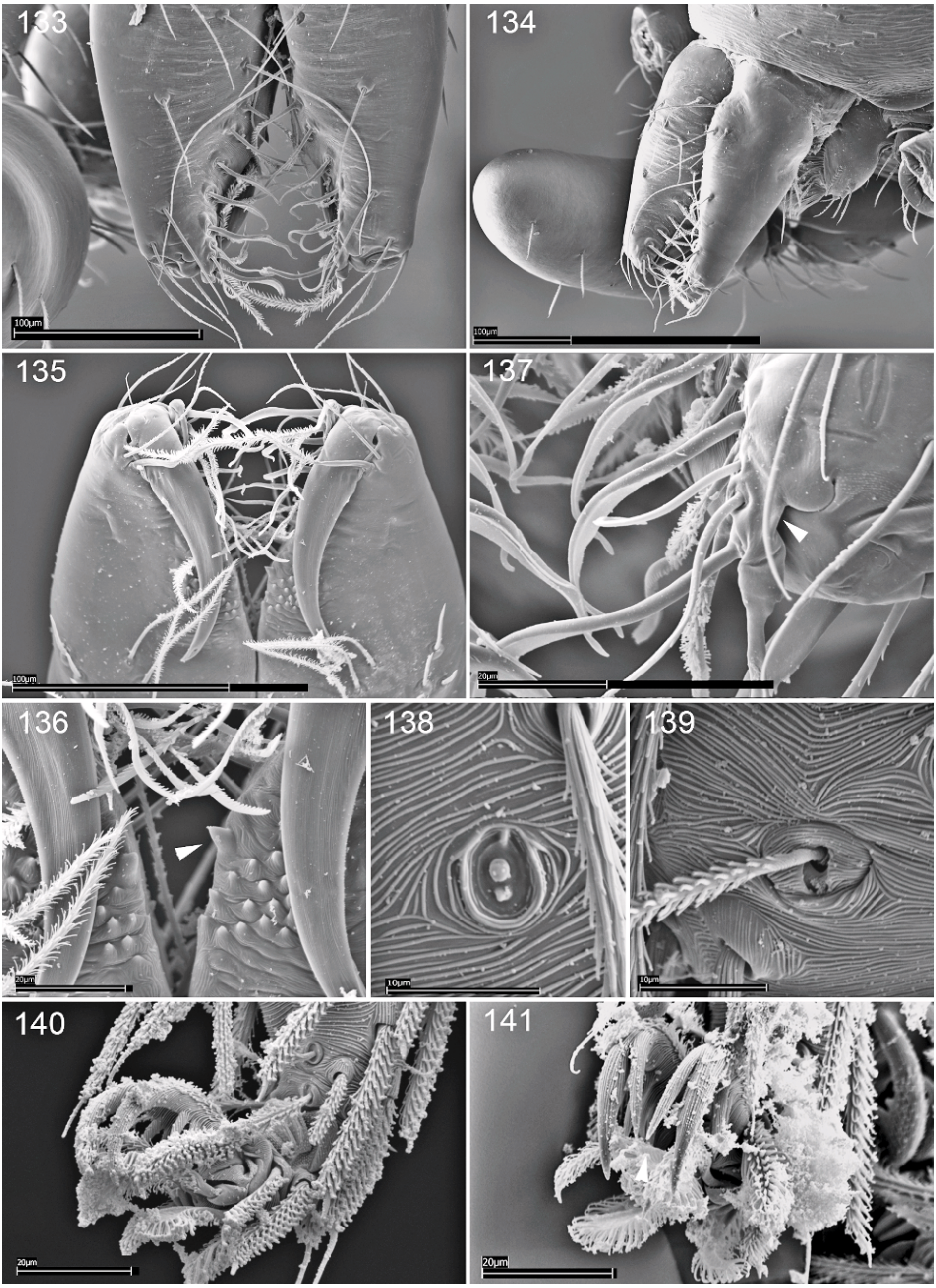


Figs. 117–124. *Malagiella vohiparara*, new species, carapace. 117–120. Male (PBI_OON 03378); 121–124 Female (PBI_OON 03078). **117, 121.** Lateral view. **118, 122.** Same, magnified view of carapace. **119, 123.** Same, anterior view. **120, 124.** Same, dorsal view. Scale bars are 100 µm (figs. 117, 119–121, 123, 124) and 10 µm (figs. 118, 122).

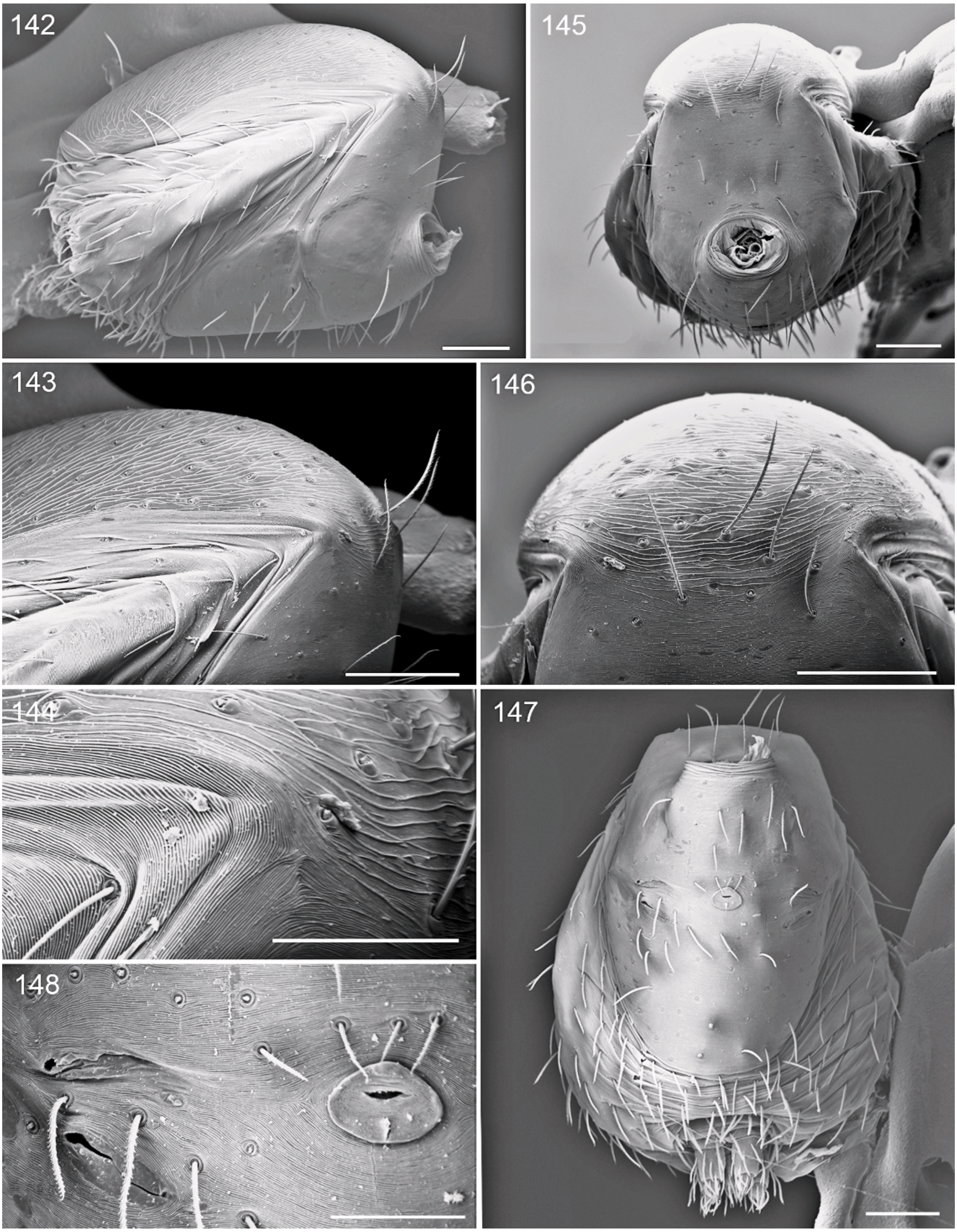


Figs. 125–132. *Malagiella vohiparara*, new species, sternal region. **125.** Male (PBI_OON 03378), sternum, ventral view. **126.** Same, sublateral view, arrow shows anterolateral knob of sternum. **127.** Same, endites and labium, ventral view. **128.** Same, endites, apical view showing serrula (arrows). **129.** Female (PBI_OON 03078), sternum, ventral view. **130.** Same, magnified view showing sternal grooves and pits (arrows). **131.** Same, sternum at coxa IV, posterioventral view, showing sternal pit (arrow). **132.** Same, endites and labium, ventral view. Scale bars are 100 µm (figs. 125, 126, 129) and 50 µm (figs. 127, 128, 130–132).

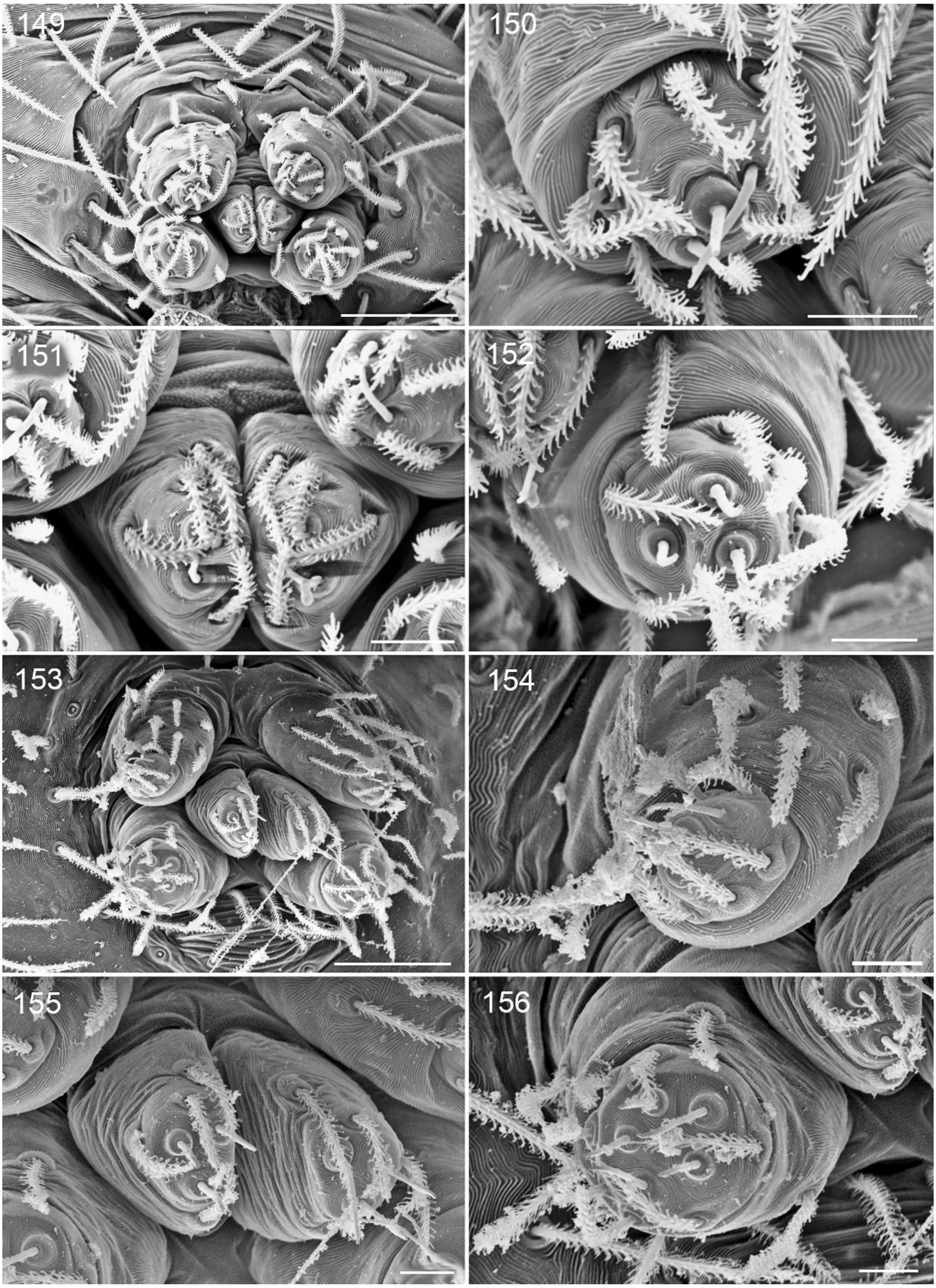
to about one diameter (figs. 217, 253, 318). Dorsal scutum size variable, may cover abdomen almost completely (figs. 247, 248), partially (figs. 279, 356), or minimally (figs. 330, 441); not fused to epigastric scutum (figs. 37, 38, 217, 336, 362). Epigastric scutum strongly (figs. 217, 218) or weakly (figs. 336, 337) sclerotized, without lateral joints. Post-


133
100µm
134
100µm
135
100µm
137
20µm
136
20µm
138
10µm
139
10µm
140
20µm
141
20µm

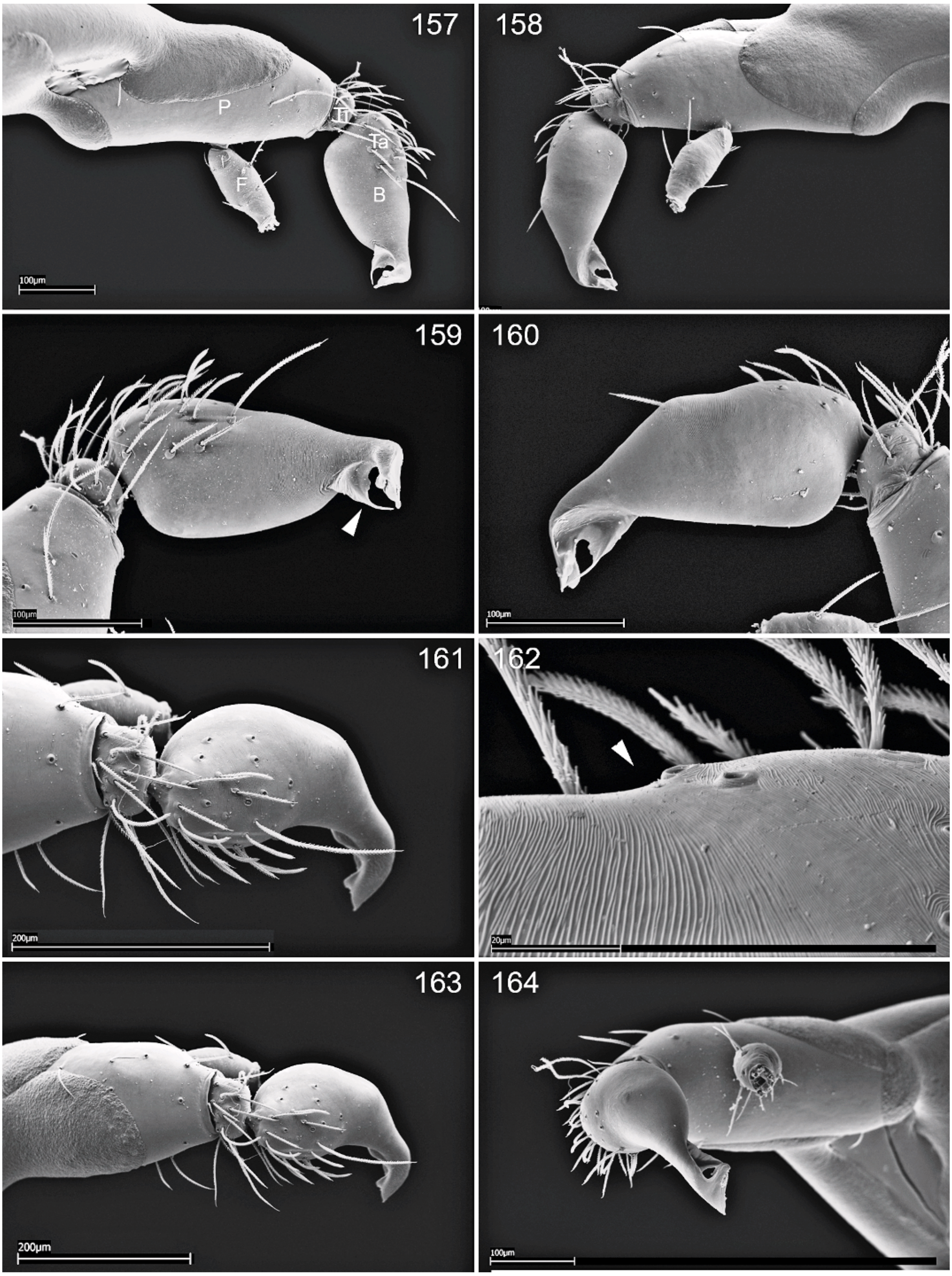
Figs. 133–141. *Malagiella vohiparara*, new species. **133.** Male (PBI_OON 03378), chelicerae, anterior view. **134.** Same, lateral view. **135.** Same, posterior view. **136.** Same, magnified view showing retromarginal denticles and promarginal tooth (arrow). **137.** Same, distal tip of chelicerae, anterior view showing flattened setae originating from cheliceral process (arrow). **138.** Same, tarsal organ from palp, dorsal view. **139.** Trichobothrium from palpal tibia, dorsal view. **140.** Female (PBI_OON 03078), claws of tarsus III, prolateral view. **141.** Same, tarsus IV, apical view showing large inner prongs (arrow).



Figs. 142–148. *Malagiella vohiparara*, new species, male abdomen (PBI_OON 03378). **142.** Lateral view. **143.** Same, magnified view. **144.** Same, detail of fused scutal area. **145.** Anterior view. **146.** Same, magnification of fused scuta. **147.** Ventral view. **148.** Same, magnified view of spiracles and sperm pore. Scale bars are 100 µm (figs. 142, 143, 145–147) and 50 µm (figs. 144, 148).



Figs. 149–156. *Malagiella vohiparara*, new species, spinnerets. **149.** Male (PBI_OON 03378), spinnerets, apical view. **150.** Same, ALS with 3 spigots. **151.** Same, PMS with 2 spigots. **152.** Same, PLS with 3 spigots. **153.** Female (PBI_OON 03078), spinnerets, apical view. **154.** Same, ALS, with 3 spigots. **155.** Same, PMS, with 3 spigots. **156.** Same, PLS, with 5 spigots. Scale bars are 50 μm (figs. 149, 153) and 10 μm (all others).


157
P
Ti
Ta
P
F
B
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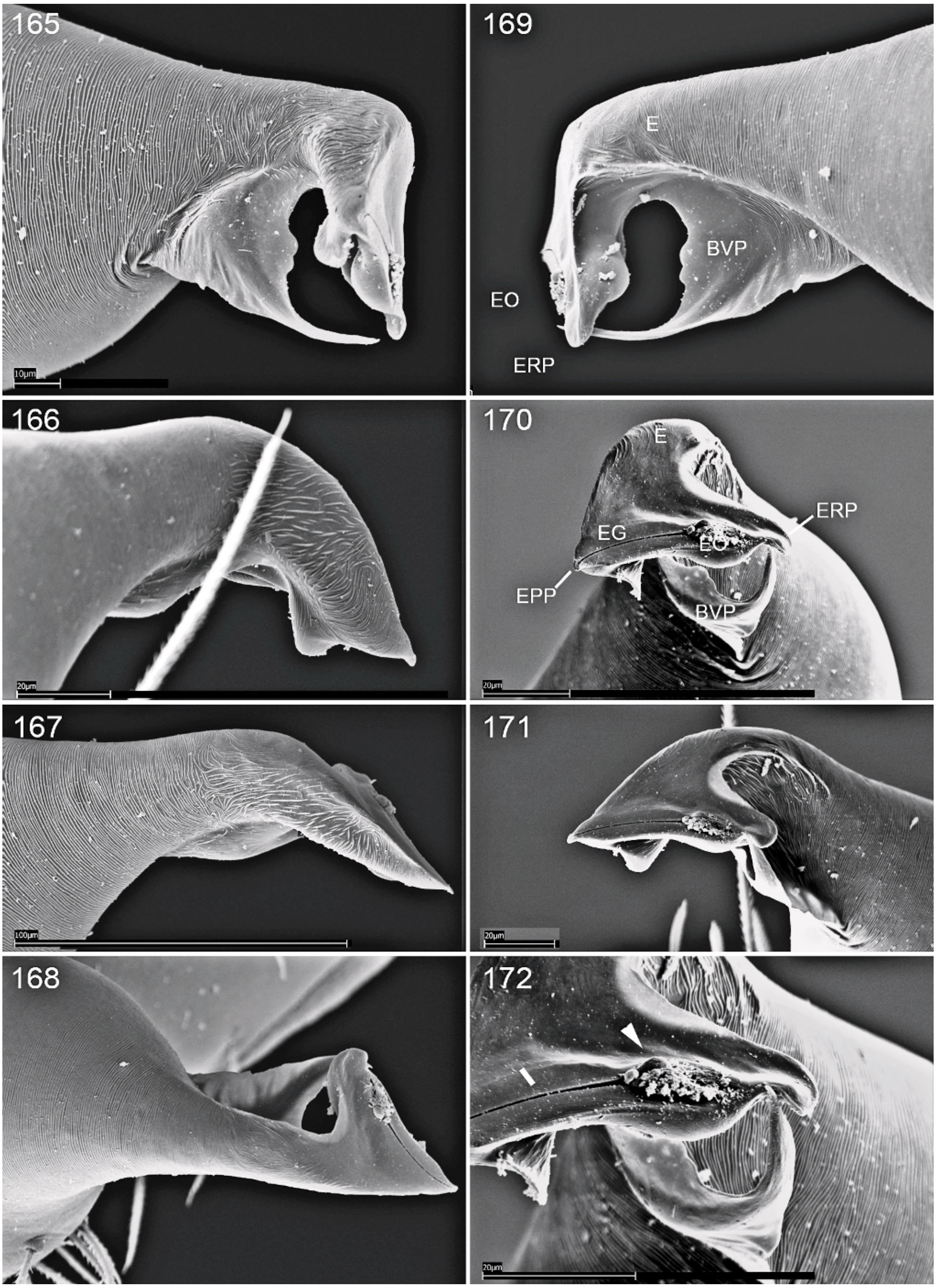
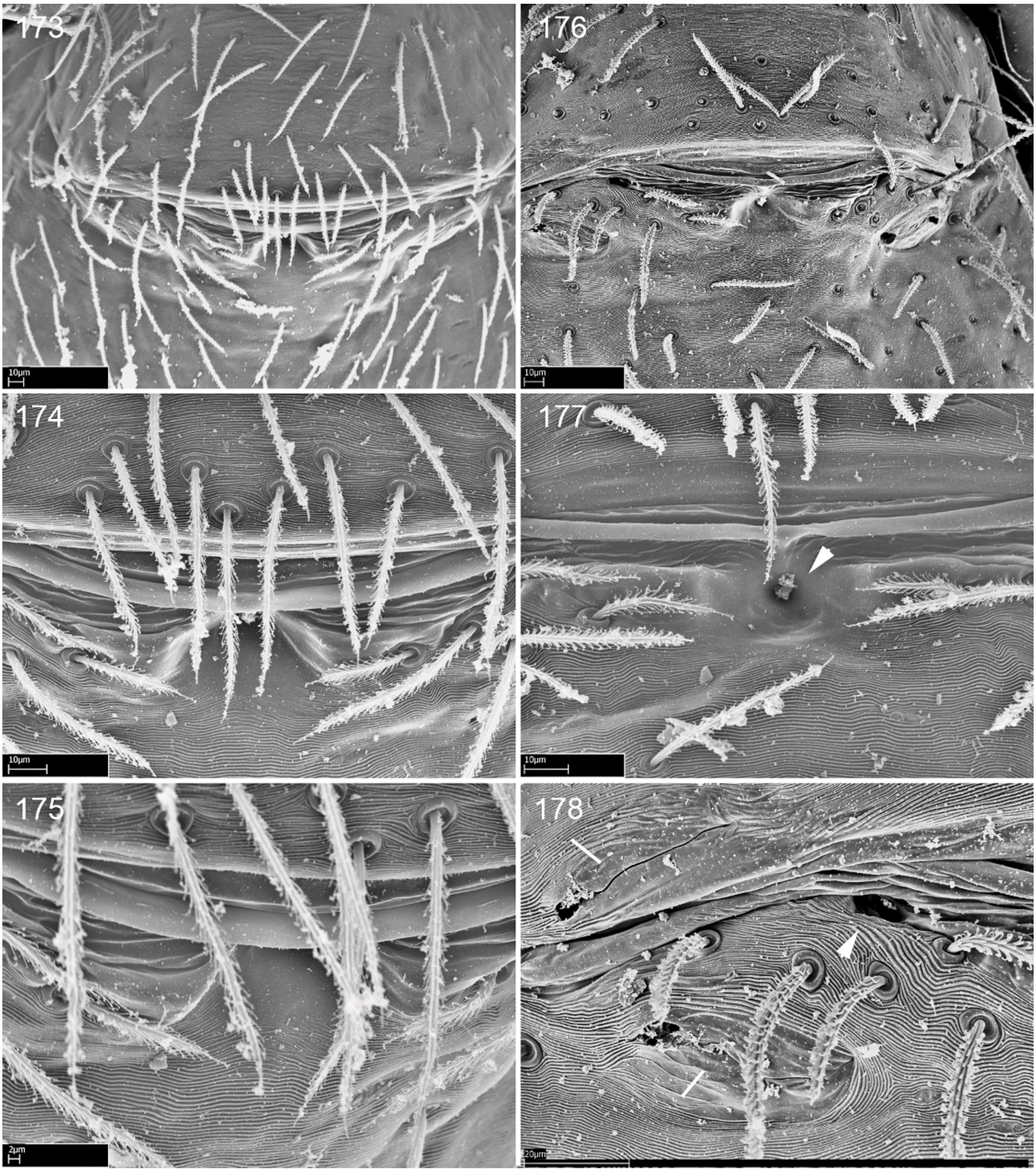
158
159
100µm
160
100µm
161
200µm
162
20µm
163
200µm
164
100µm

Figs. 157–164. *Malagiella vohiparara*, new species, male palp, femur to bulb (PBI_OON 03378). **157.** Palp, prolateral view. **158.** Same, retrolateral view. **159.** Bulb, prolateral view with arrow to ventral process (BVP). **160.** Same, retrolateral view. **161.** Same, dorsal view. **162.** Same, retrolateral view showing bulb-tarsus junction (arrow). **163.** Palp, dorsal view. **164.** Same, ventral view. B = bulb, F = femur, P = patella, Ta = tarsus, Ti = tibia.

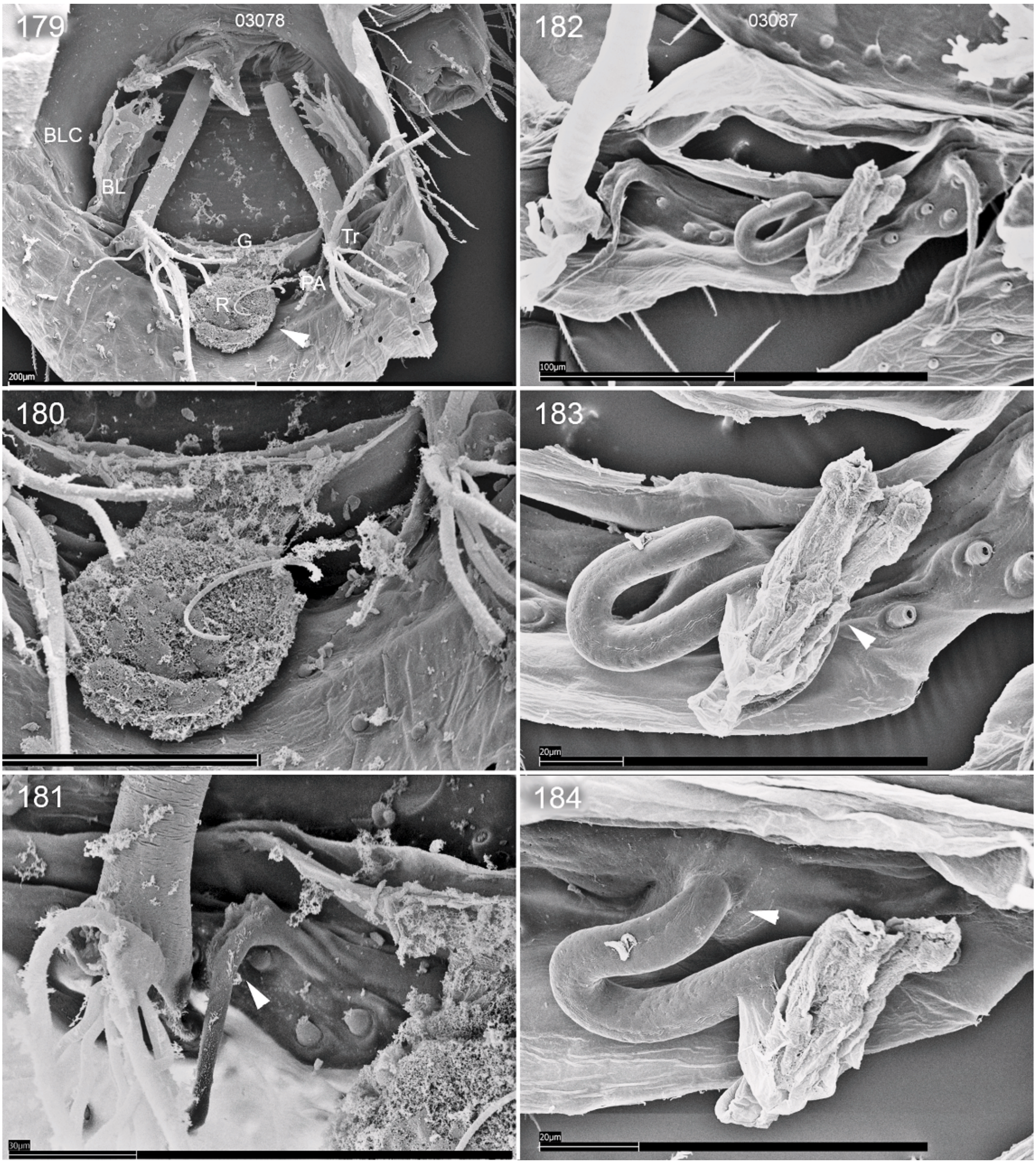

165
10µm
169
E
BVP
EO
ERP
166
20µm
170
E
ERP
EG
EO
EPP
BVP
20µm
167
100µm
171
20µm
168
172
20µm

Figs. 165–172. *Malagiella vohiparara*, new species, male (PBI_OON 03378). **165.** Embolar region, prolateral view. **166.** Same, more dorsal. **167.** Same, still more dorsal. **168.** Same, fully dorsal view. **169.** Same, retrolateral view. **170.** Same, apical view. **171.** Same, lateroapical view. **172.** Same, magnified view showing embolar opening (arrow) and prolateral groove (dash). BVP = bulb ventral prong, E = embolus, EG = embolus groove, EO = embolus opening, EPP = embolus prolateral process, ERP = embolus retrolateral process.



Figs. 173–178. *Malagiella vohiparara*, new species, female external genitalia (PBI_OON 03078). **173–175.** Ventral views at increasing magnification. **176.** Posterior view. **177.** Same, magnified view showing copulatory opening (arrow). **178.** Same, showing respiratory spiracles (dashes) and apodeme orifice (arrow).

epigastric scutum broadly hexagonal; sclerotized strongly (fig. 228), or weakly (figs. 375, 459); not fused to epigastric scutum, with posteriorly directed lateral apodemes, with small lateral sclerites (figs. 213, 342, 382). Dense patch of setae anterior to spinnerets present (figs. 218, 219), but may be weak (figs. 364, 448). Spinnerets (scanned in *M. ranomafana*, fig. 44, and *M. vohiparara*, fig. 153): ALS with three spigots (figs. 45,


179
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200µm
182
03087
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180
183
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181
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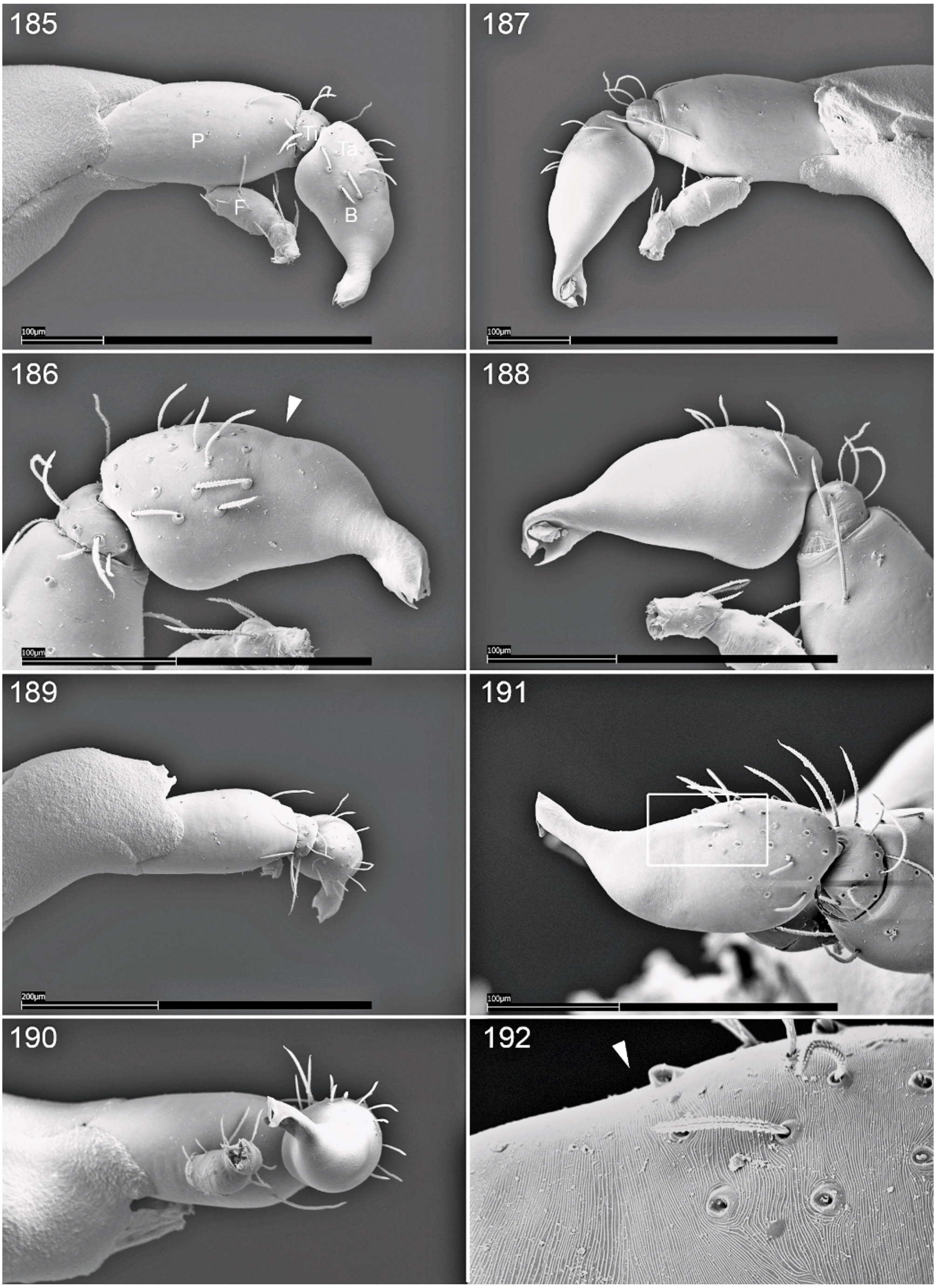
184
20µm

Figs. 179–184. *Malagiella vohiparara*, new species, female internal genitalia (179–181: PBI_OON 03078; 182–184: PBI_OON 03087). **179.** Epigynal region, posteriodorsal view, of partially digested specimen showing membrane enclosing receptaculum. **180.** Same, close-up of receptaculum. **181.** Same, showing apodeme (arrow). **182.** Same, of more fully digested specimen. **183.** Same, close-up of receptaculum showing cleaned duct with remains of membrane (arrow). **184.** Same, slightly more dorsal view showing attachment of duct (arrow). BL = book lung, BLC = book lung cover, G = gonopore, PA = posterior apodeme, R = receptaculum, Tr = trachea.


185
P
Ti
Ta
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187
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188
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191
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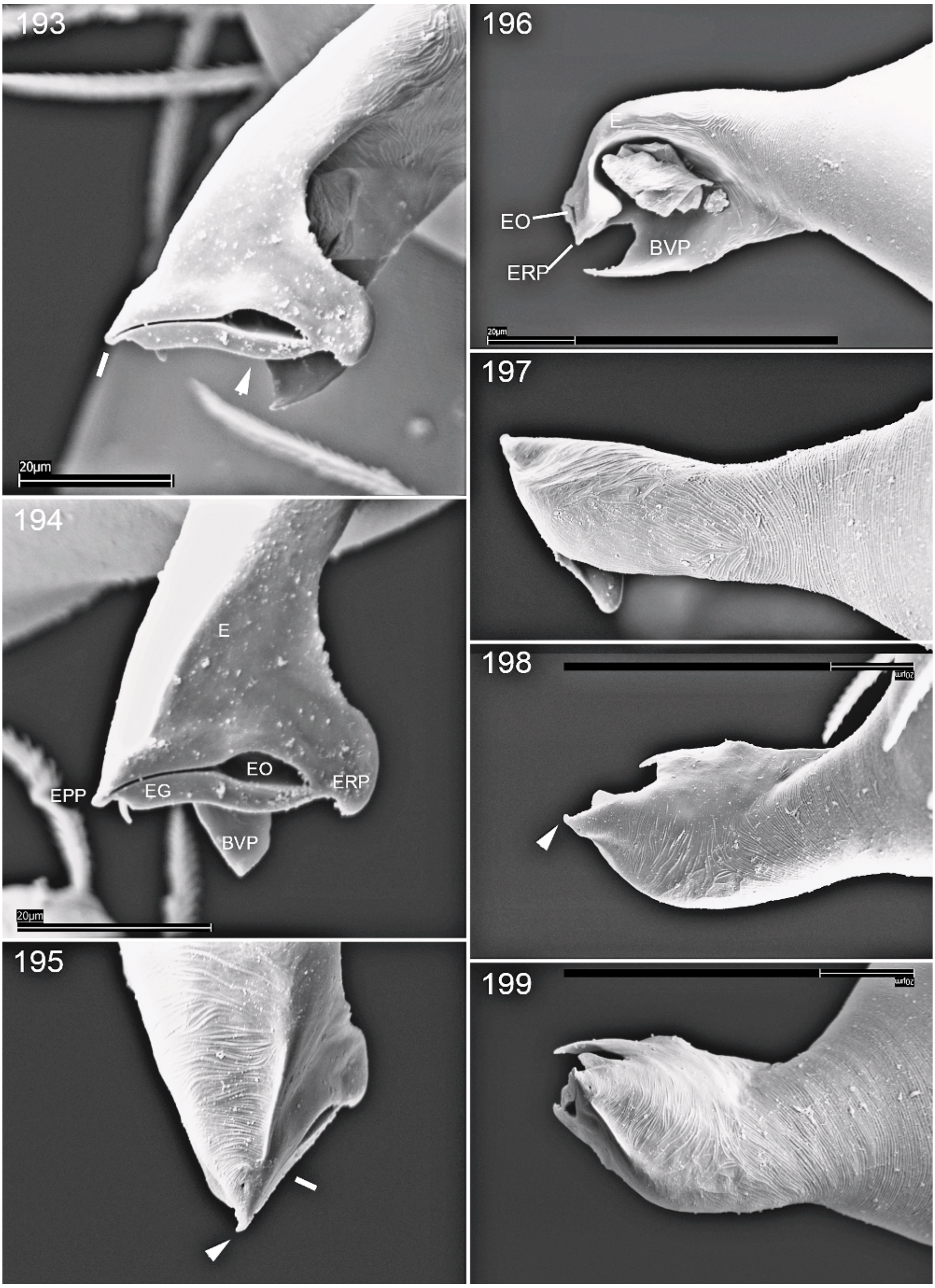
192

Figs. 185–192. *Malagiella toliara*, new species, male palp, femur to bulb (PBI_OON 08377). **185.** Palp, prolateral view. **186.** Same, magnified view showing dorsal depression (arrow). **187.** Palp, retrolateral view. **188.** Same, magnified view. **189.** Palp, dorsal view. **190.** Same, ventral view. **191.** Palpal bulb and tarsus, dorsal view. **192.** Same, magnified view showing boundary of bulb and tarsus (arrow). B = bulb, F = femur, P = patella, Ta = tarsus, Ti = tibia.


193
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194
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ERP
BVP
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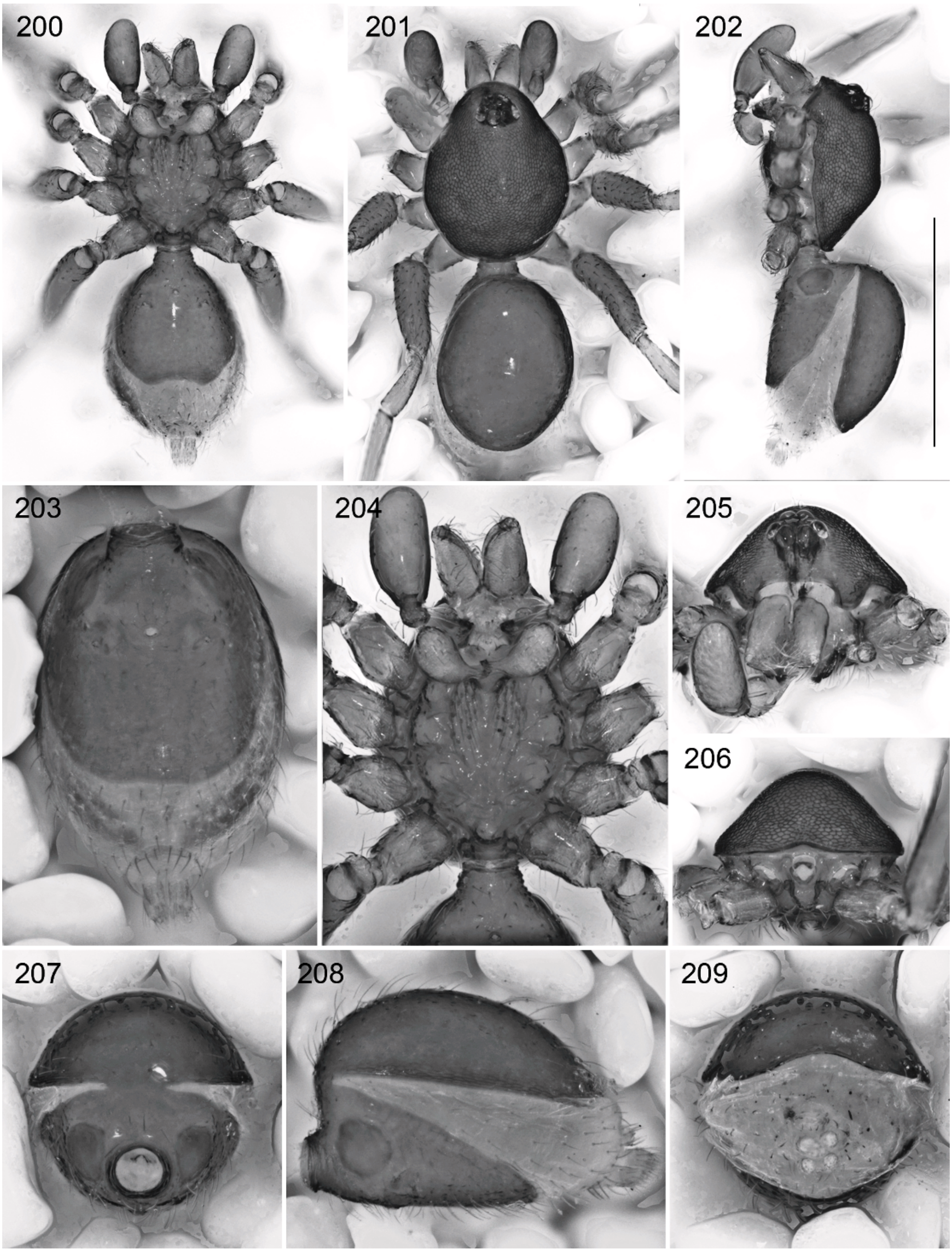
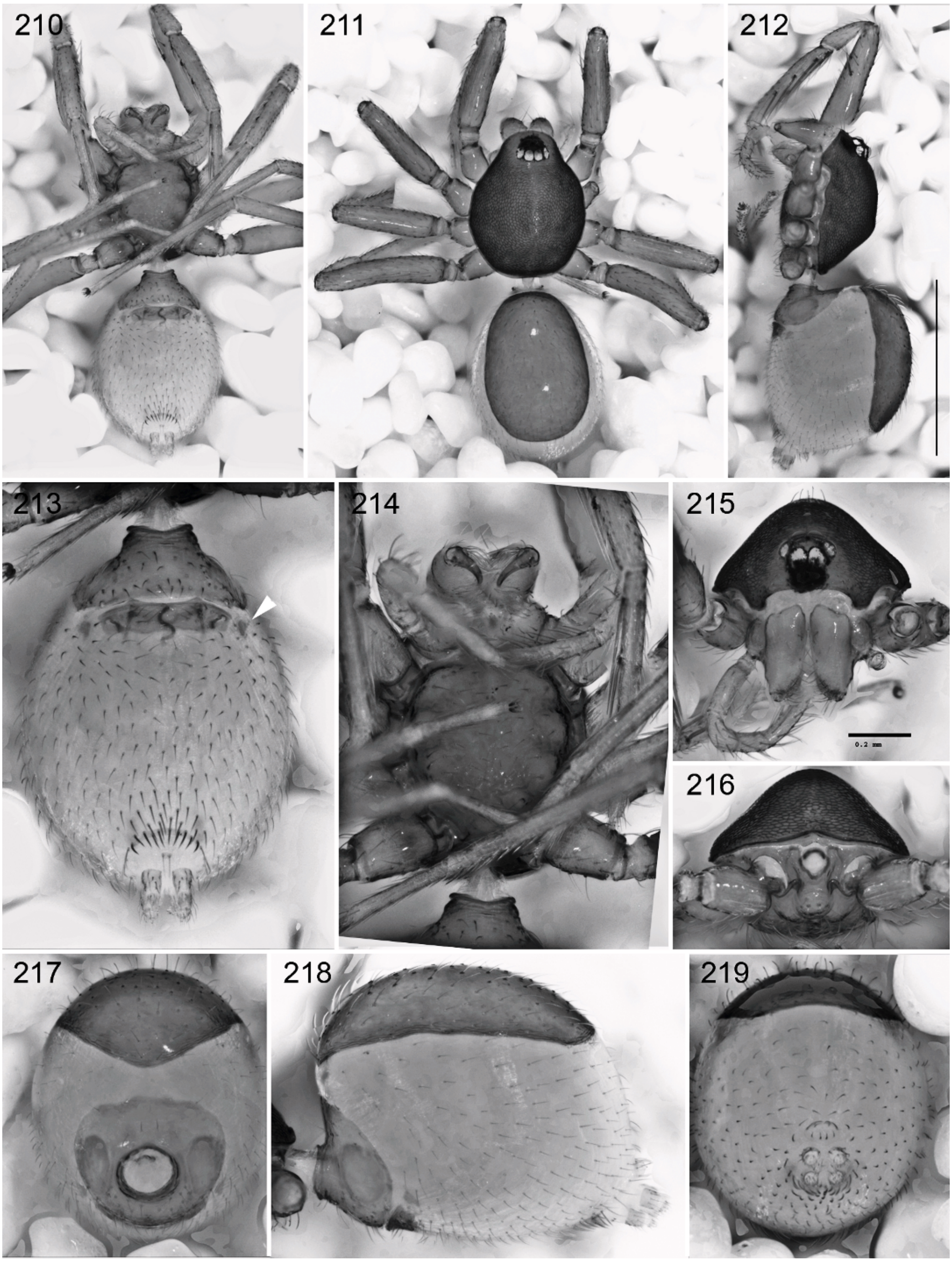
195
196
E
EO
ERP
BVP
20µm
197
198
20µm
199
20µm

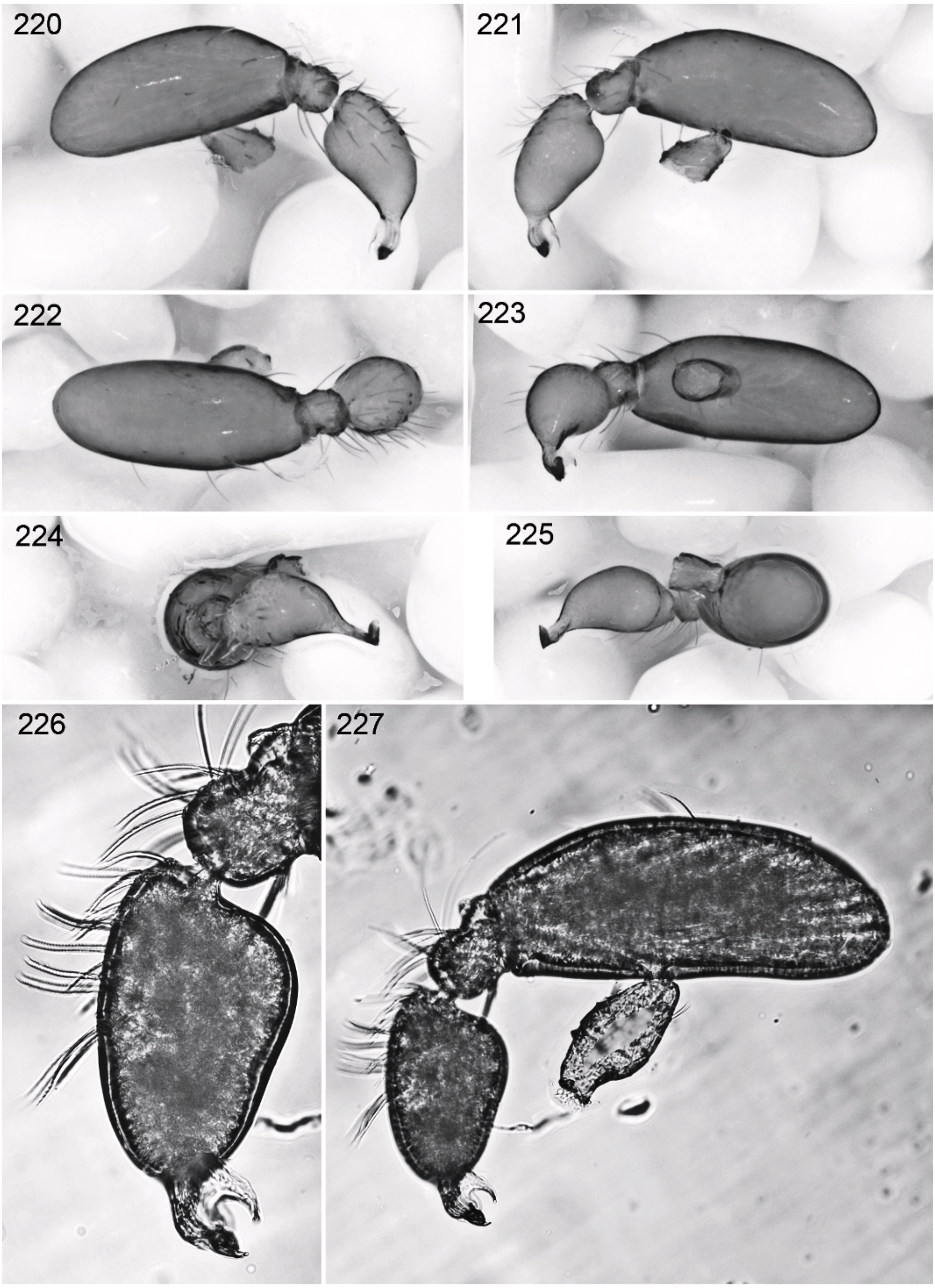
Figs. 193–199. *Malagiella toliara*, new species, male palp (PBI_OON 08377). **193.** Embolus, apical view, arrow to embolar opening, dash to edge of embolar groove. **194.** Same, somewhat enlarged. **195.** Same, prolateral view, with arrow to prolateral prong and dash to groove. **196.** Same, retrolateral view. **197.** Same, dorsal view. **198.** Same, somewhat more prolateral view, arrow to projection bearing embolar groove. **199.** Same, fully prolateral view. BVP = bulb ventral prong, E = embolus, EG = embolus groove, EO = embolus opening, EPP = embolus prolateral process, ERP = embolus retrolateral process.



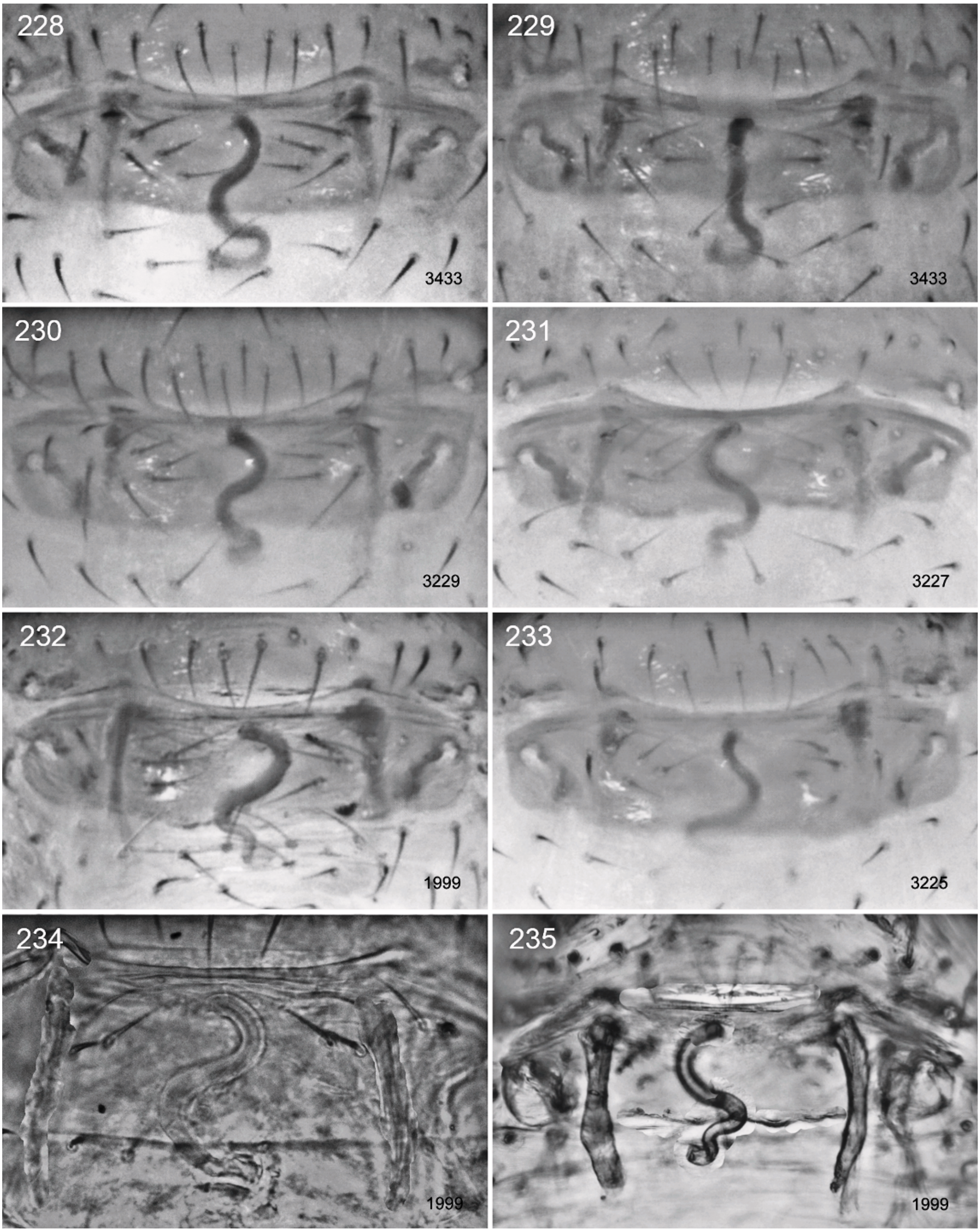
Figs. 200–209. *Malagiella ranomafana*, new species, male (PBI_OON 01999). **200.** Habitus, ventral view. **201.** Same, dorsal view. **202.** Same, lateral view. Scale bar = 1 mm. **203.** Abdomen, ventral view. **204.** Cephalothorax, ventral view. **205.** Same, anterior view. **206.** Same, posterior view. **207.** Abdomen, anterior view. **208.** Same, lateral view. **209.** Same, posterior view.



Figs. 210–219. *Malagiella ranomafana*, new species, female (PBI_OON 03227). **210.** Habitus, ventral view. **211.** Same, dorsal view. **212.** Same, lateral view. Scale bar = 1 mm. **213.** Abdomen, ventral view, with arrow showing lateral sclerite. **214.** Cephalothorax, ventral view. **215.** Same, anterior view. **216.** Same, posterior view. **217.** Abdomen, anterior view. **218.** Same, lateral view. **219.** Same, posterior view.



Figs. 220–227. *Malagiella ranomafana*, new species, male (220–225: PBI_OON 01999; 226, 227: PBI_OON 03224). **220.** Palp, femur to bulb, prolateral view. **221.** Same, retrolateral view. **222.** Same, dorsal view. **223.** Same, ventral view. **224.** Same, anterior view. **225.** Same, posterior view. **226.** Bulb, retrolateral view. **227.** Palp, retrolateral view.


228
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229
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3229
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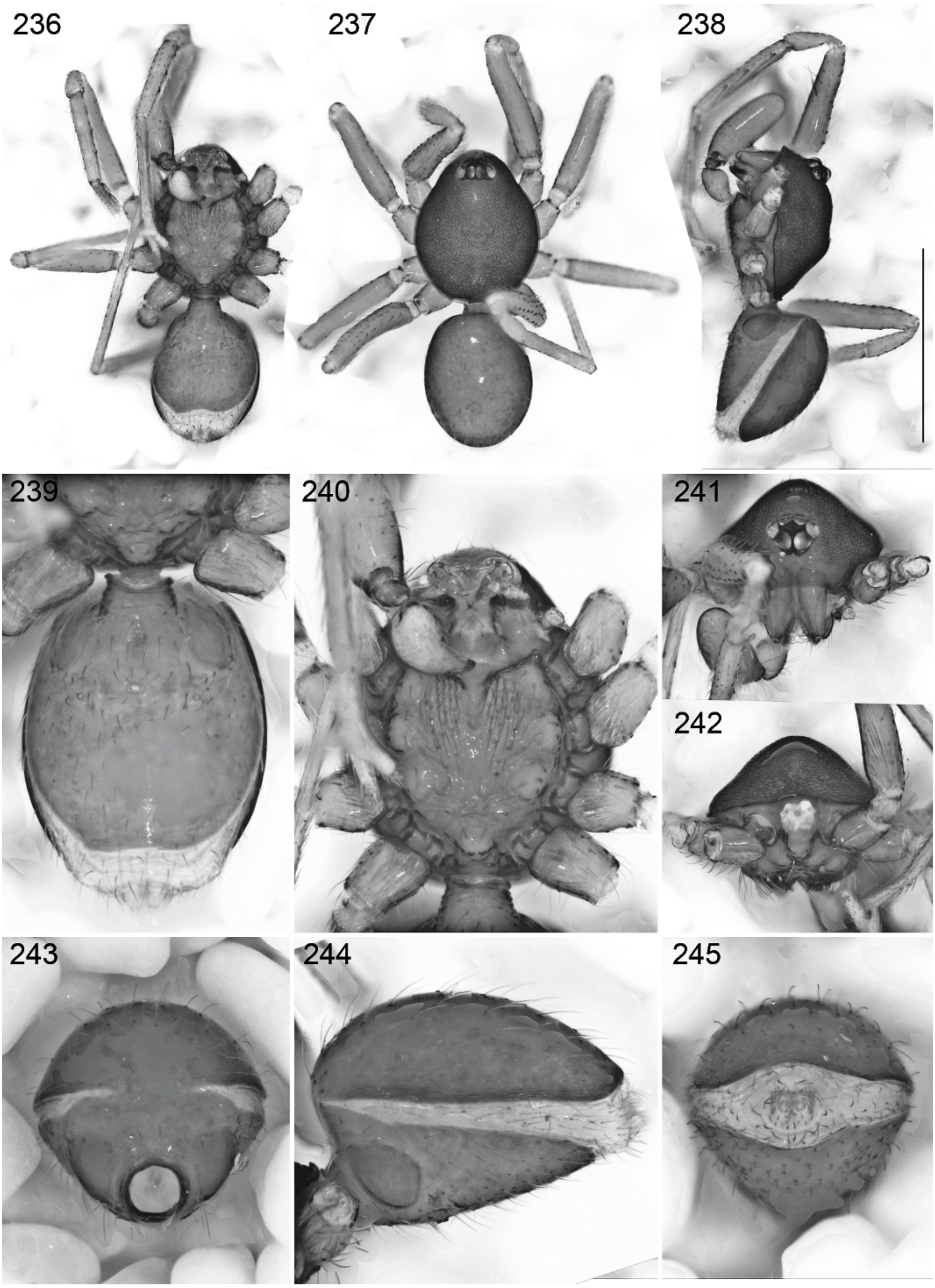
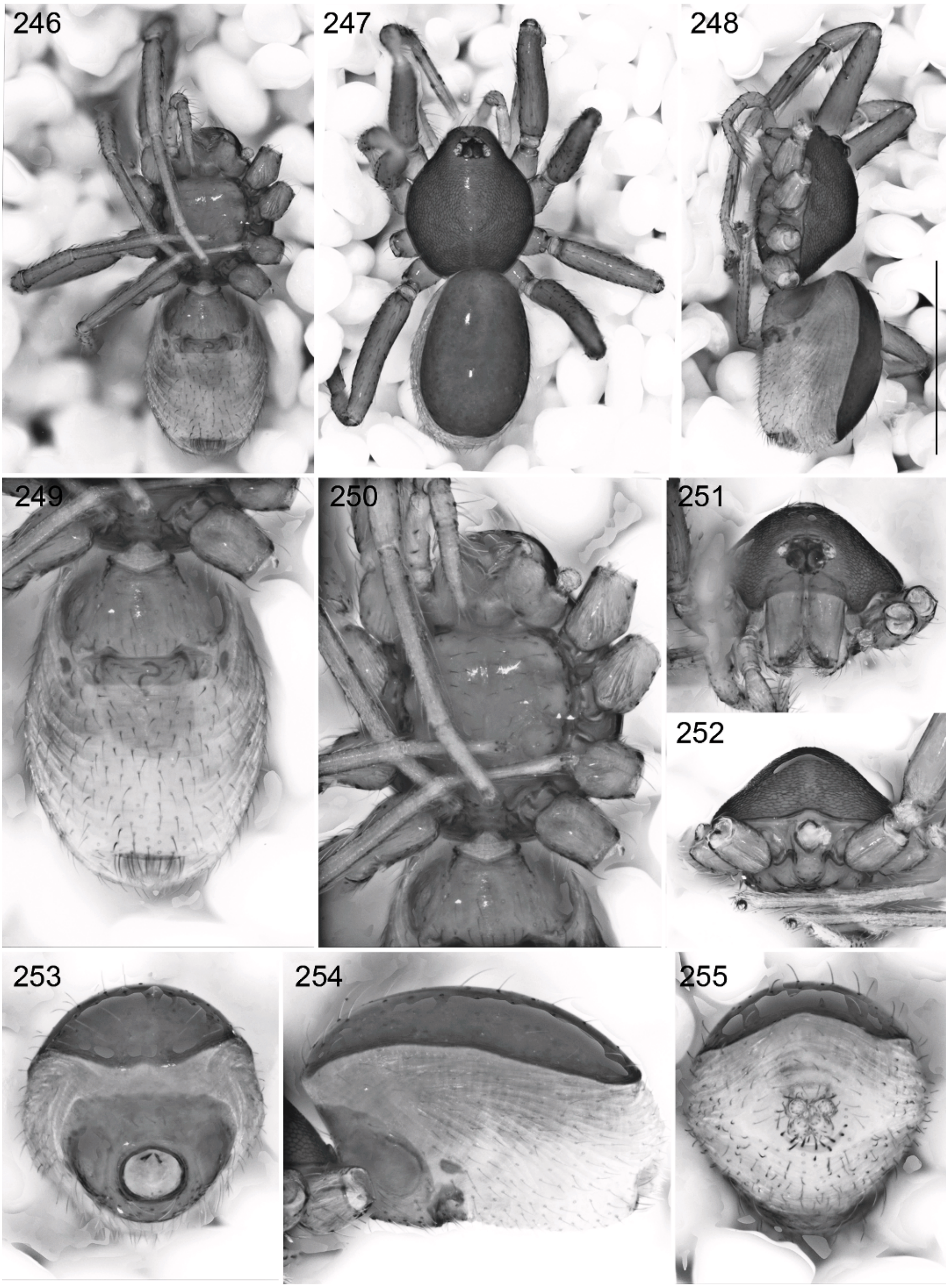
234
1999
235
1999

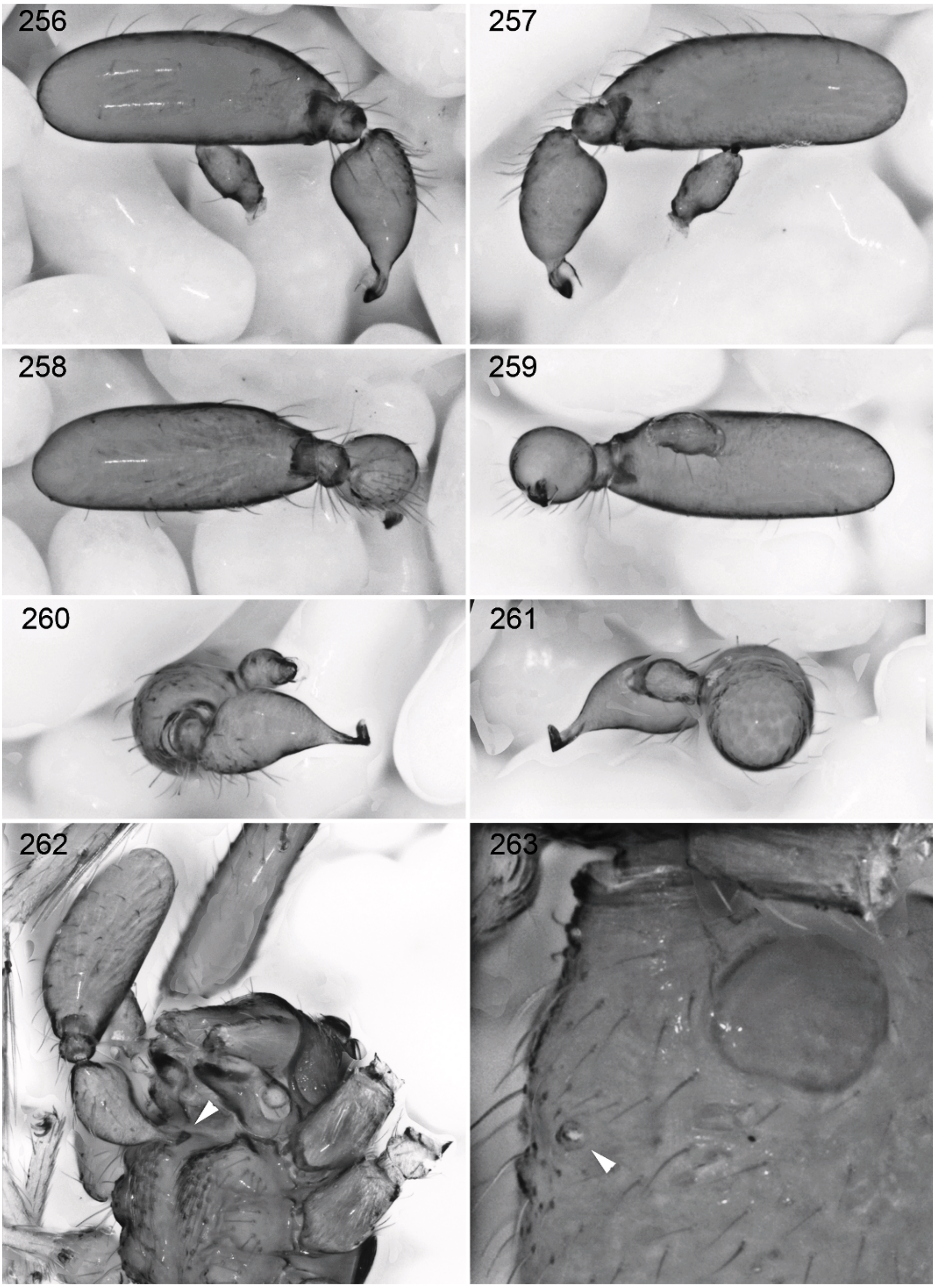
Figs. 228–235. *Malagiella ranomafana*, new species, female epigynal variation. **228.** Epigynal area, ventral view, PBI_OON 03433. **229.** Same, but different specimen, PBI_OON 03433. **230.** Same, PBI_OON 03229. **231.** Same, PBI_OON 03227. **232.** Same, PBI_OON 01999. **233.** Same, PBI_OON 03225. **234.** Same, PBI_OON 01999, cleared. **235.** Same, PBI_OON 01999, dorsal view.



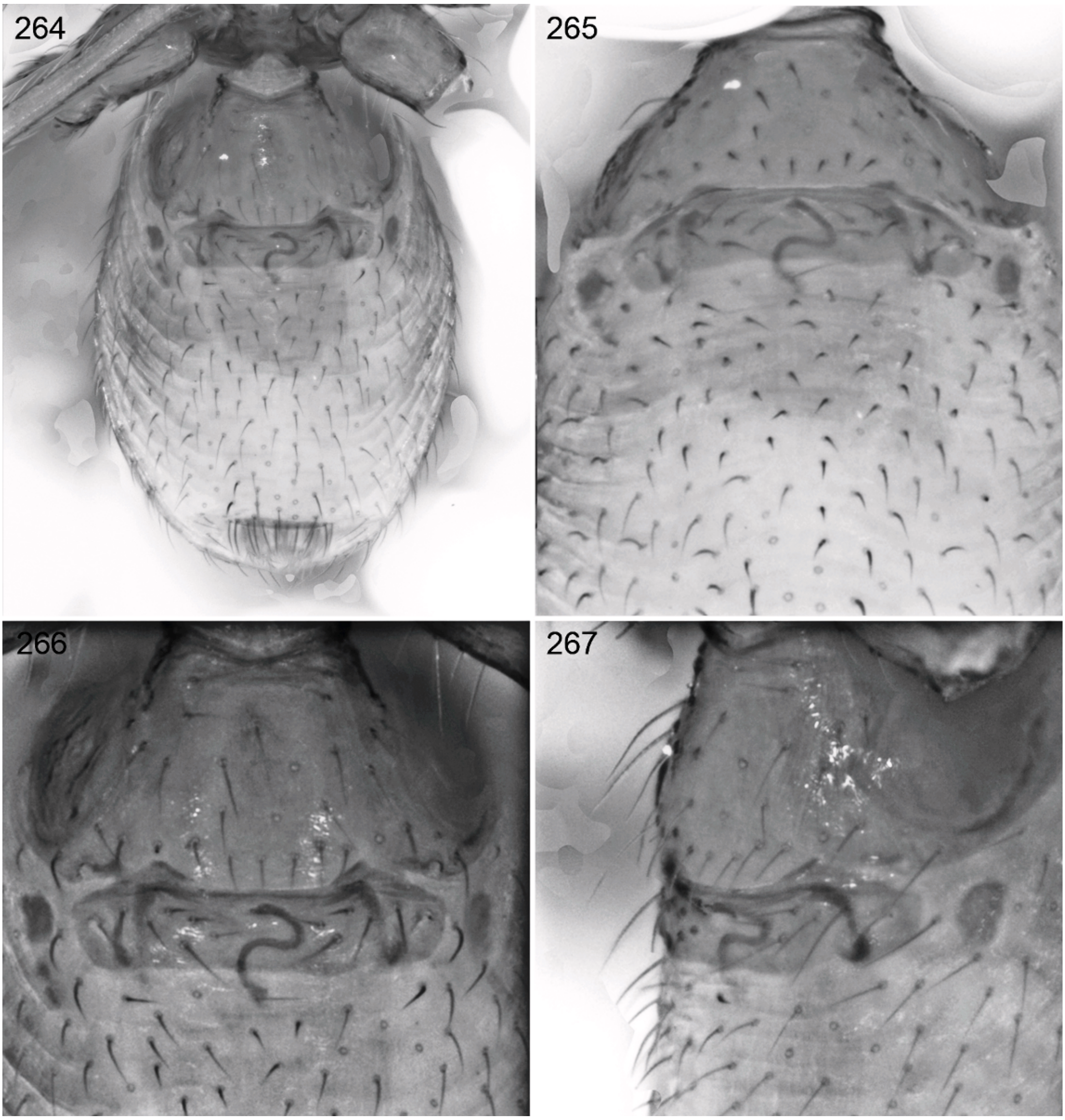
Figs. 236–245. *Malagiella valterova*, new species, male (PBI_OON 03461). **236.** Habitus, ventral view. **237.** Same, dorsal view. **238.** Same, lateral view. Scale bar = 1 mm. **239.** Abdomen, ventral view. **240.** Cephalothorax, ventral view. **241.** Same, anterior view. **242.** Same, posterior view. **243.** Abdomen, anterior view. **244.** Same, lateral view. **245.** Same, posterior view.



Figs. 246–255. *Malagiella valterova*, new species, female (PBI_OON 03461). **246.** Habitus, ventral view. **247.** Same, dorsal view. **248.** Same, lateral view. Scale bar = 1 mm. **249.** Abdomen, ventral view. **250.** Cephalothorax, ventral view. **251.** Same, anterior view. **252.** Same, posterior view. **253.** Abdomen, anterior view. **254.** Same, lateral view. **255.** Same, posterior view.



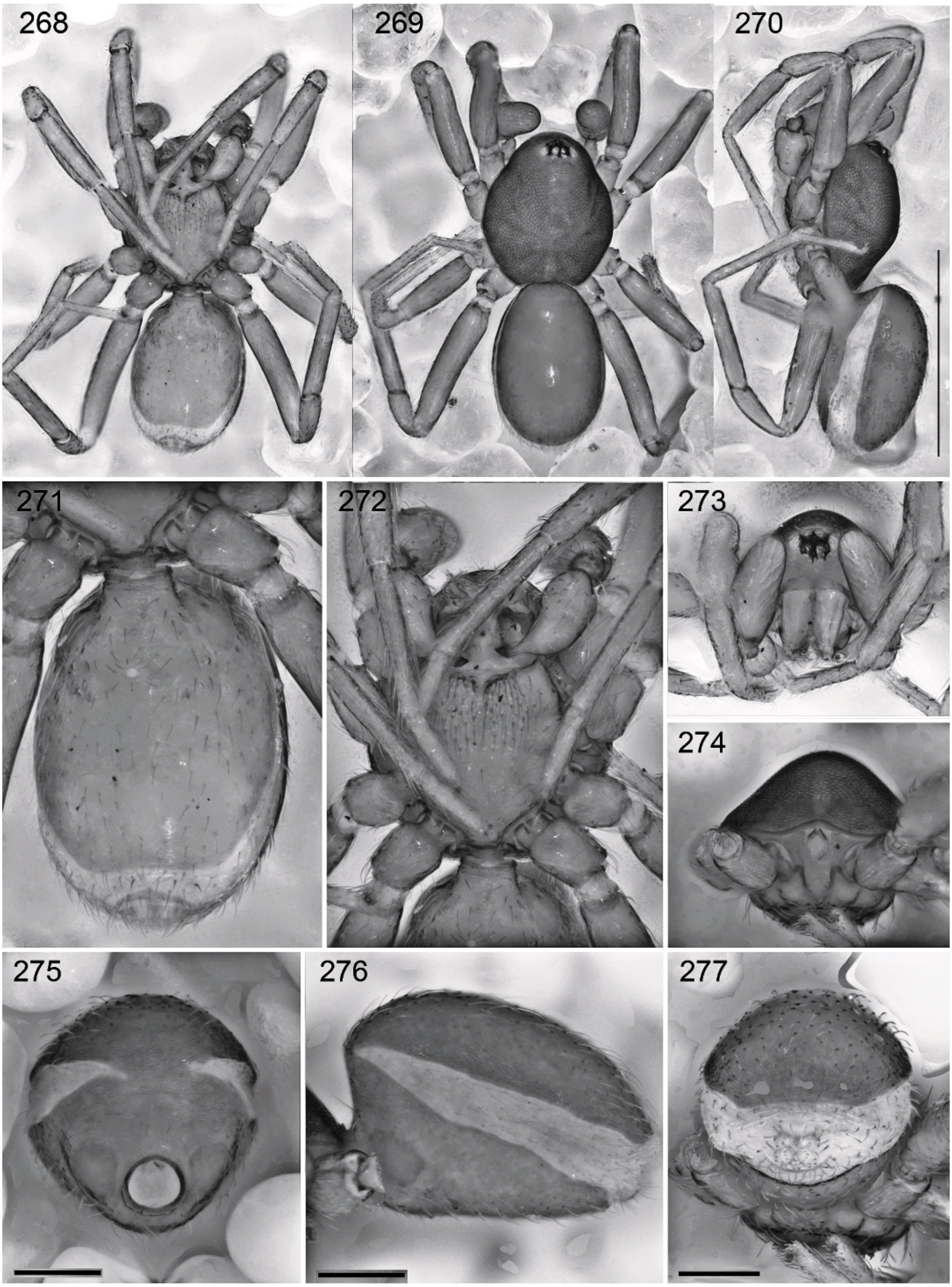
Figs. 256–263. *Malagiella valterova*, new species, male (PBI_OON 03461). **256.** Palp, femur to bulb, prolateral view. **257.** Same, retrolateral view. **258.** Same, dorsal view. **259.** Same, ventral view. **260.** Same, anterior view. **261.** Same, posterior view. **262.** Cephalothorax, sublateral view, showing embolus in resting position (arrow). **263.** Abdomen, sublateral view, showing sperm pore (arrow).



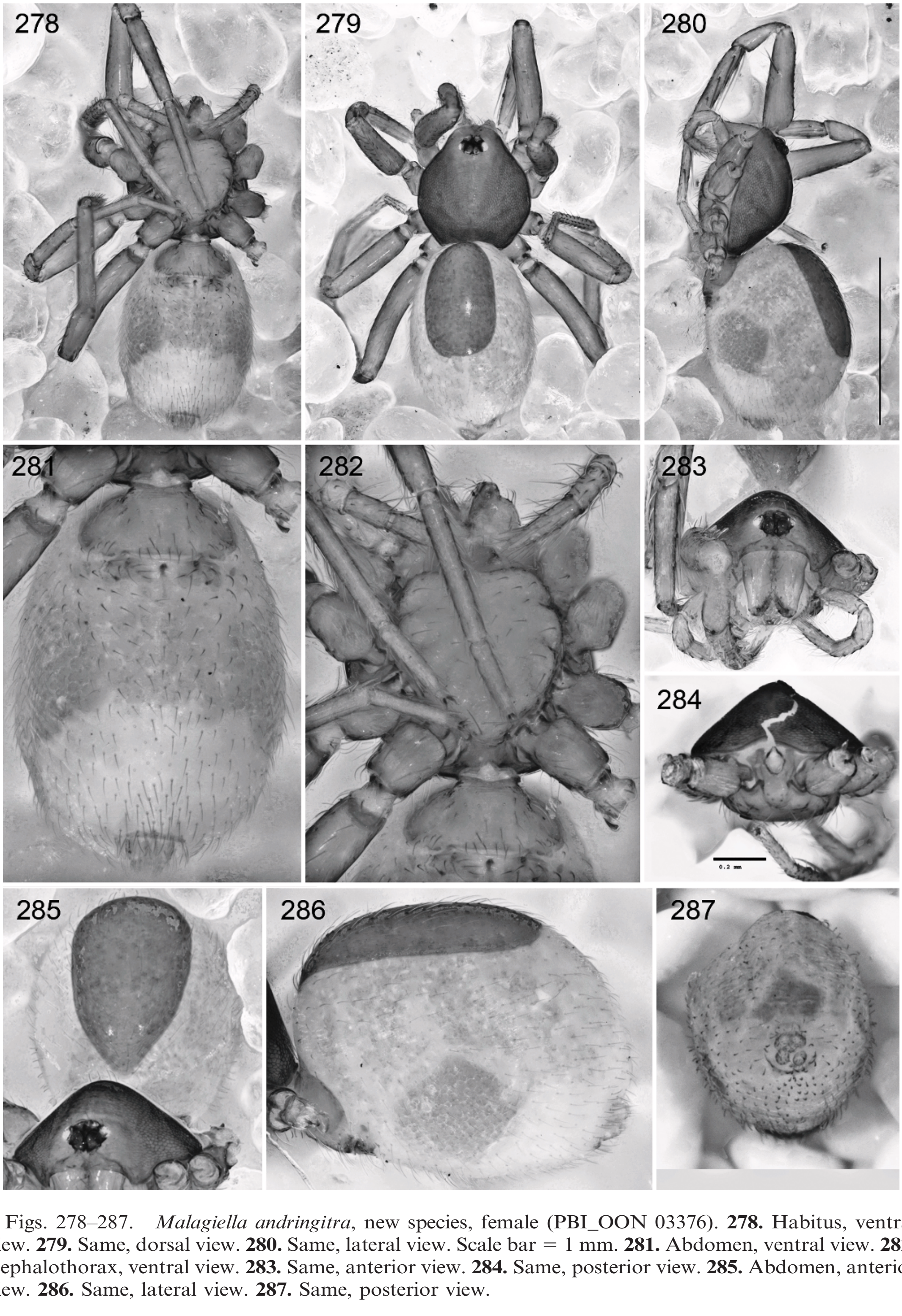
Figs. 264–267. *Malagiella valterova*, new species, female (PBI_OON 03461). **264.** Abdomen, ventral view. **265.** Same, more posterior view. **266.** Epigynal region, ventral view. **267.** Same, lateral view.

154), PMS with three spigots (figs. 46, 155), PLS with six spigots in *M. ranomafana* (fig. 47) and five spigots in *M. vohiparara* (fig. 156). LEGS: Leg spination (figs. 466–471) as in male. Tarsi I–III superior claws (figs. 79–82) as in male, tarus IV superior claws with three teeth on lateral surfaces and one large apical tooth on median surfaces of both proclaw and retroclaw (figs. 83, 84). Trichobothria (figs. 70–73) as in male. Tarsal organ (figs. 65–69) as in male.

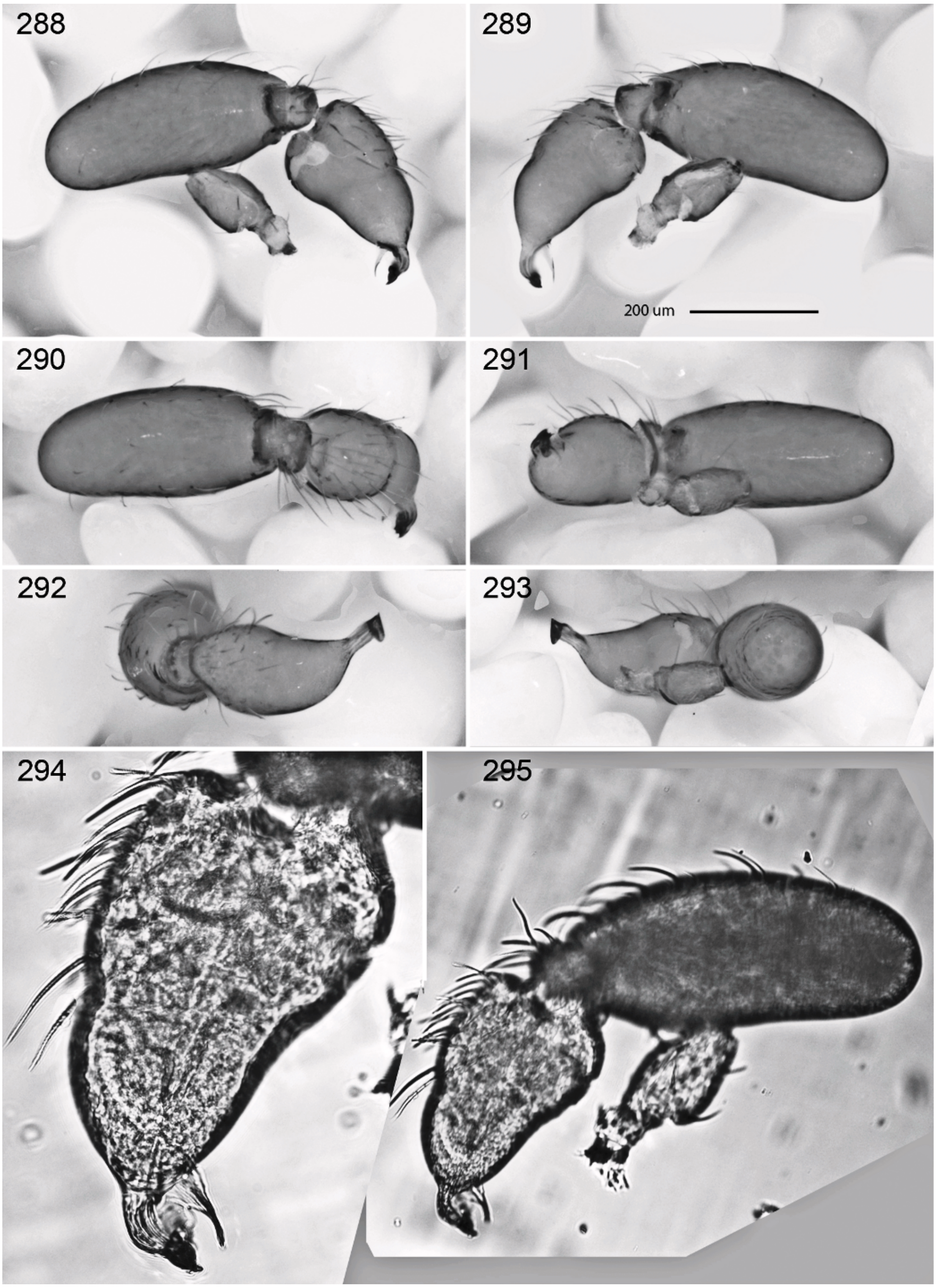
NATURAL HISTORY: Little can be said of the natural history of *Malagiella*. All species for which there is information occur in forests; most are from eastern evergreen humid forests, *M. toliara* and *M. goodmani* are from southern deciduous dry forests. Based on collection data, 38 specimens were



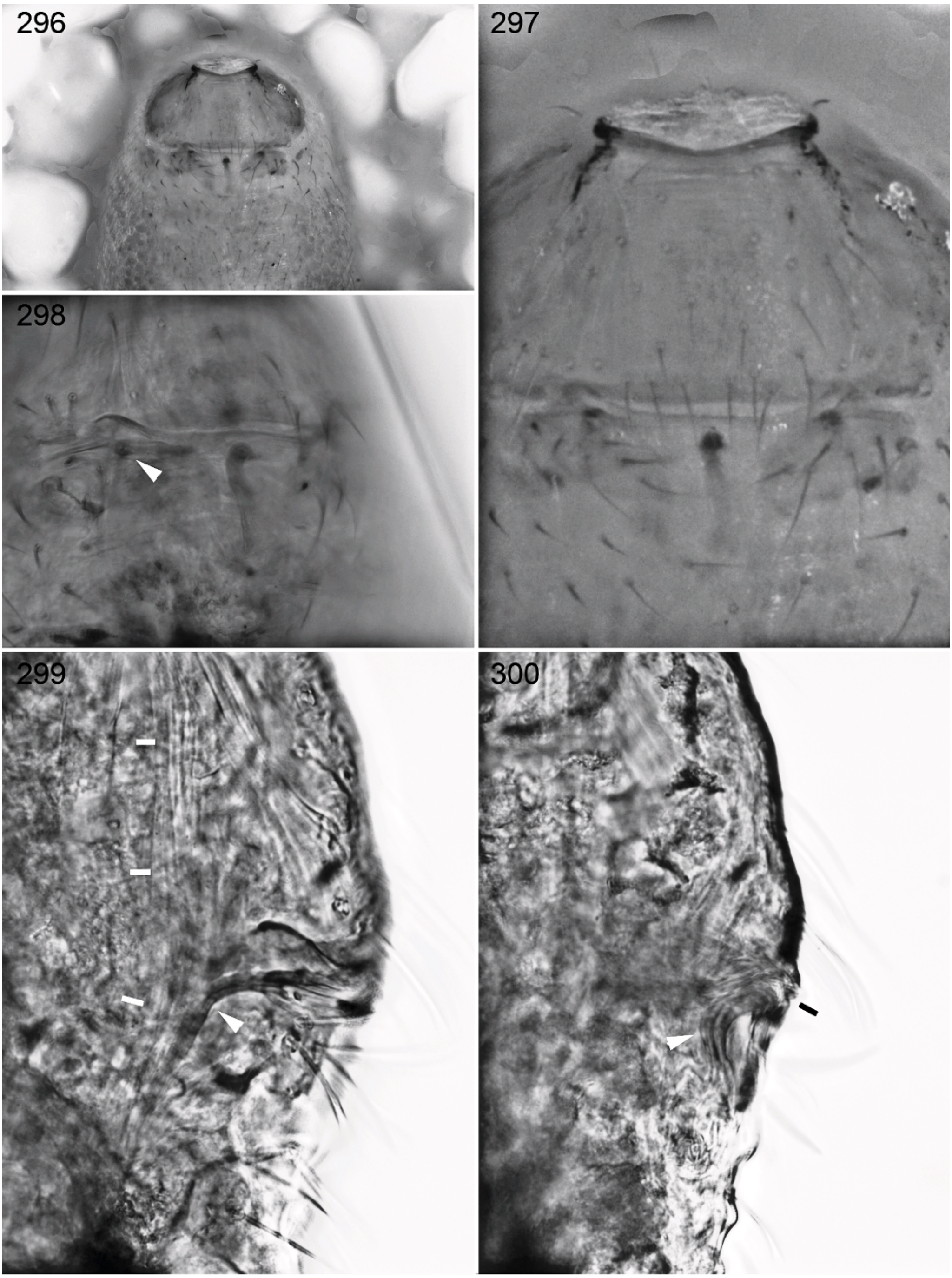
Figs. 268–277. *Malagiella andringitra*, new species, male (PBI_OON 03234). **268.** Habitus, ventral view. **269.** Same, dorsal view. **270.** Same, lateral view. Scale bar = 1 mm. **271.** Abdomen, ventral view. **272.** Cephalothorax, ventral view. **273.** Same, anterior view. **274.** Same, posterior view. **275.** Abdomen, anterior view. **276.** Same, lateral view. **277.** Same, posterior view.



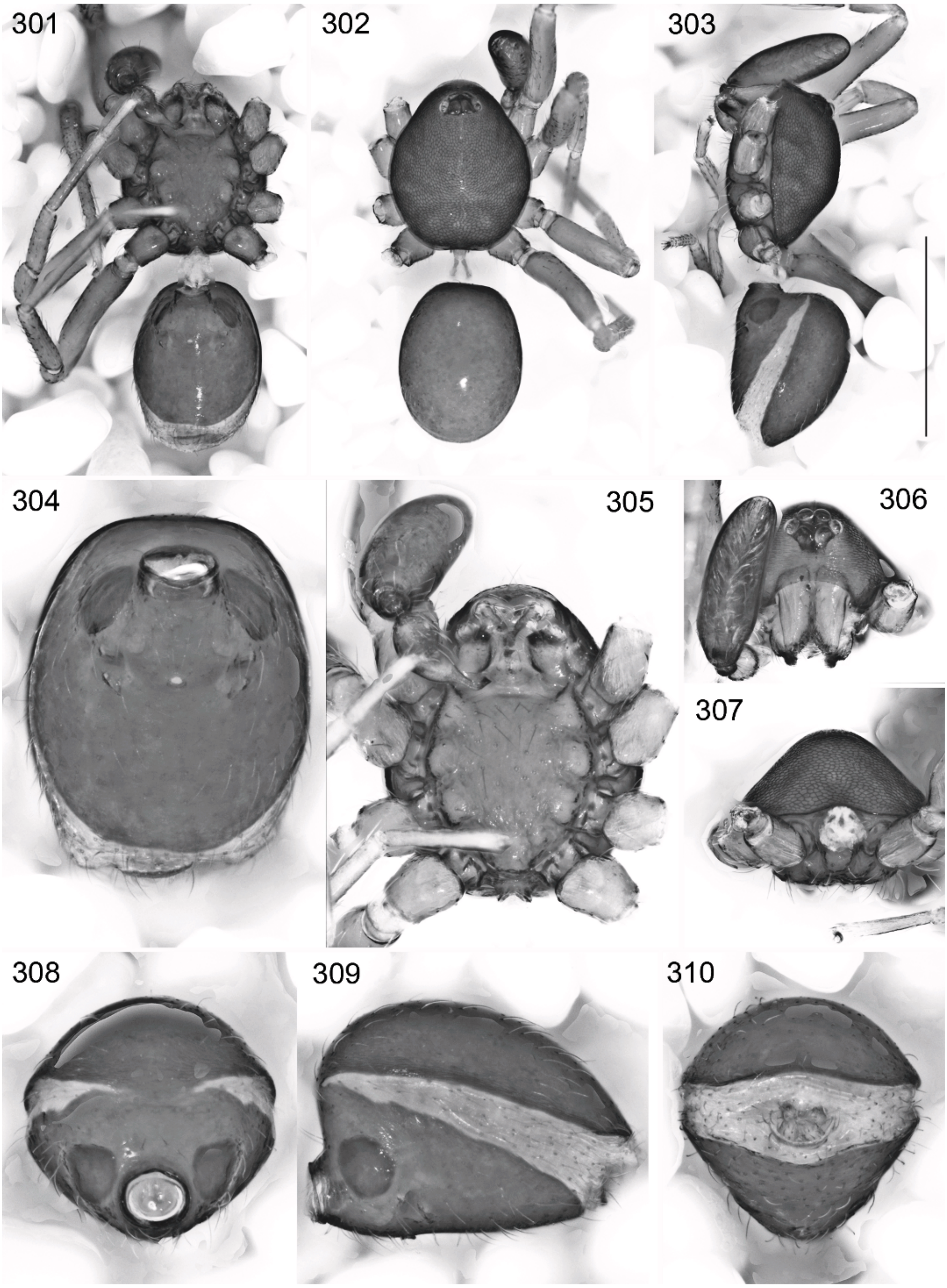
Figs. 278–287. *Malagiella andringitra*, new species, female (PBI_OON 03376). **278.** Habitus, ventral view. **279.** Same, dorsal view. **280.** Same, lateral view. Scale bar = 1 mm. **281.** Abdomen, ventral view. **282.** Cephalothorax, ventral view. **283.** Same, anterior view. **284.** Same, posterior view. **285.** Abdomen, anterior view. **286.** Same, lateral view. **287.** Same, posterior view.



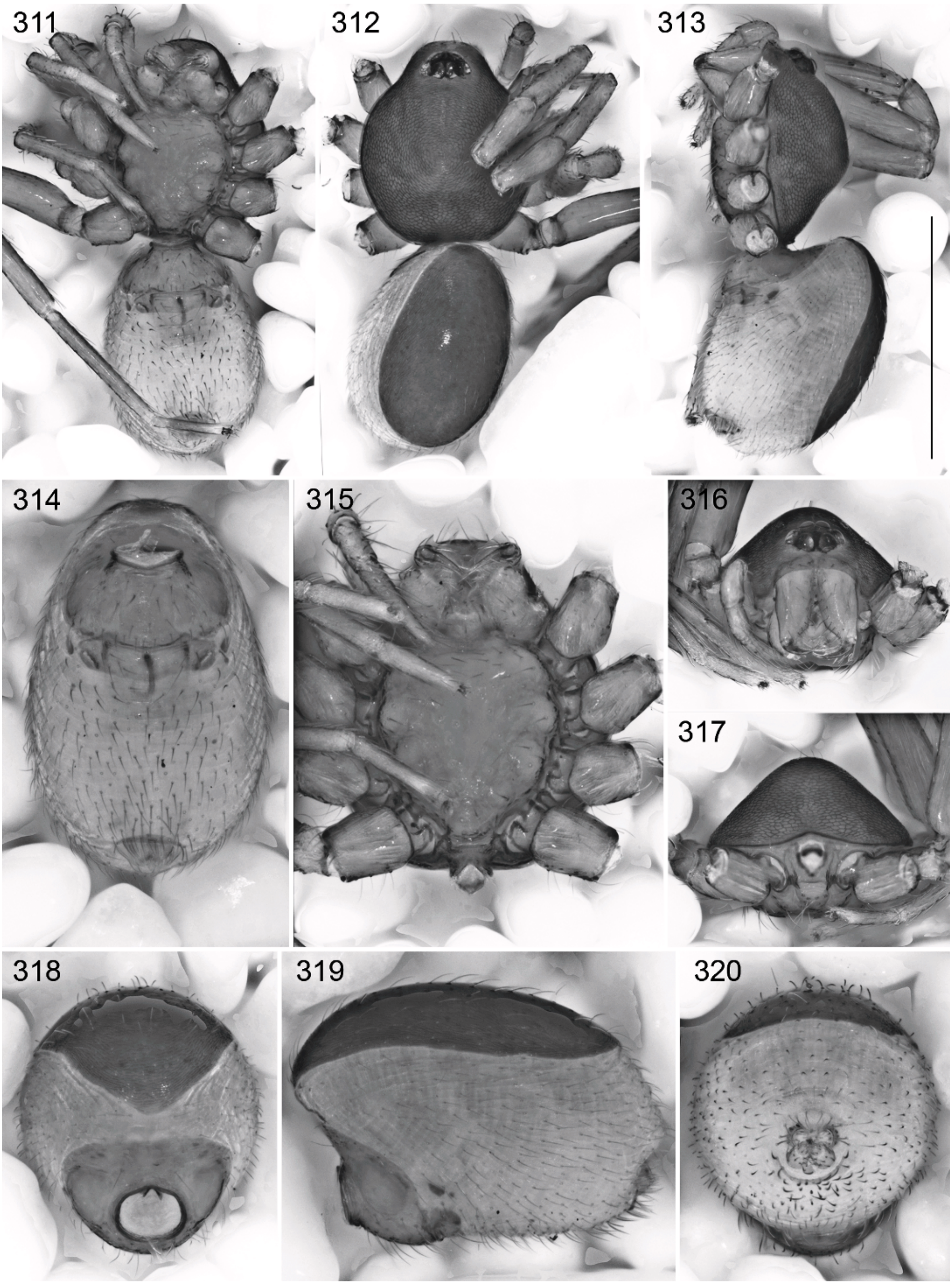
Figs. 288–295. *Malagiella andringitra*, new species, male (PBI_OON 03234). **288.** Palp, femur to bulb, prolateral view. **289.** Same, retrolateral view. **290.** Same, dorsal view. **291.** Same, ventral view. **292.** Same, anterior view. **293.** Same, posterior view. **294.** Bulb, retrolateral view. **295.** Palp, retrolateral view. Note: images are of the right palp and have been reversed to give a left perspective comparable to images of other species.



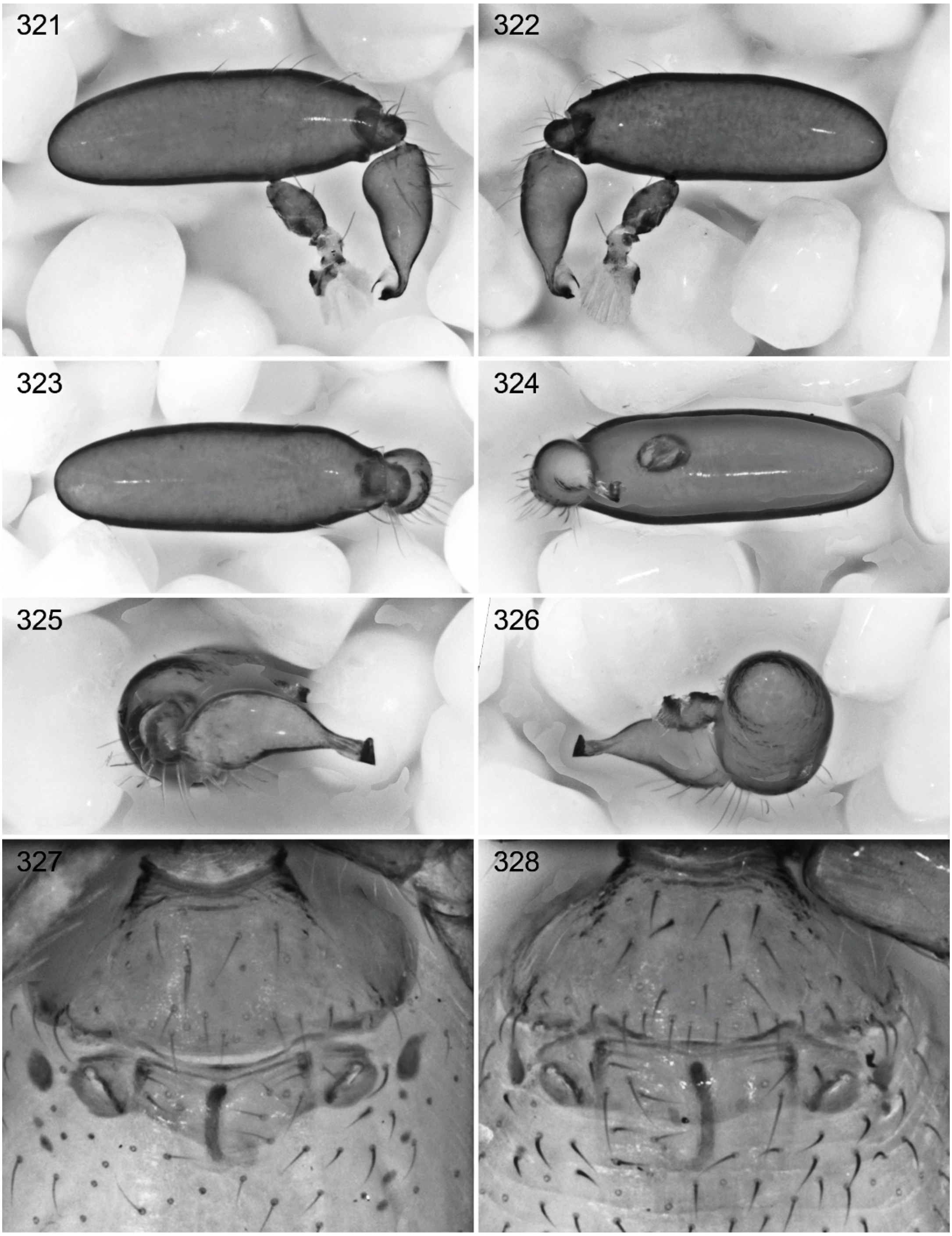
Figs. 296–300. *Malagiella andringitra*, new species, female (PBI_OON 03376). **296.** Abdomen, ventral view. **297.** Epigynal region, ventral view. **298.** Same, cleared specimen, arrow to apodeme orifice. **299.** Same, lateral view, focus on apodeme (arrow) and associated muscles (dashes). **300.** Same, focus on receptaculum (arrow) showing orifice (dash).



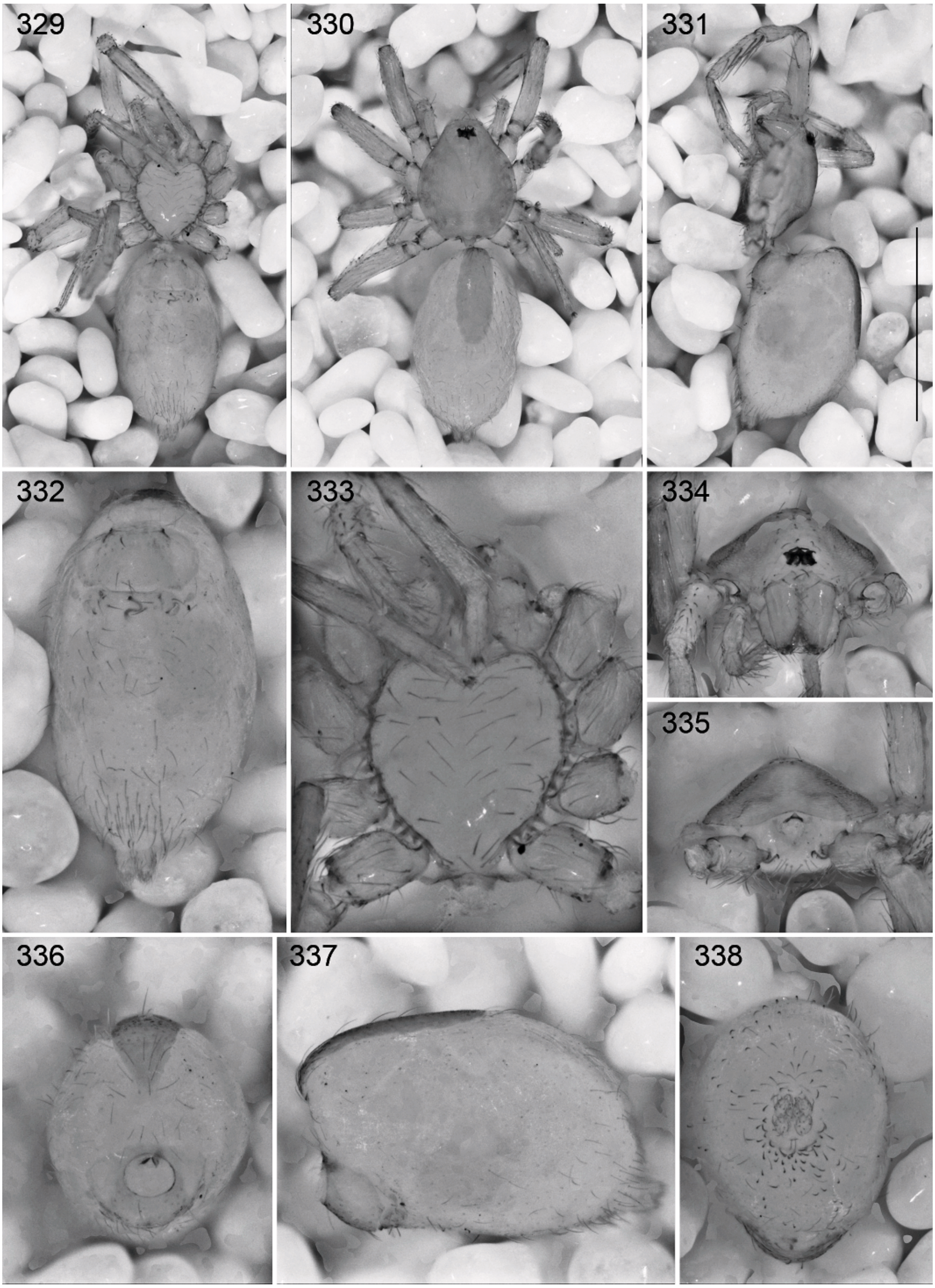
Figs. 301–310. *Malagiella fisheri*, new species, male (PBI_OON 03452). **301.** Habitus, ventral view. **302.** Same, dorsal view. **303.** Same, lateral view. Scale bar = 1 mm. **304.** Abdomen, ventral view. **305.** Cephalothorax, ventral view. **306.** Same, anterior view. **307.** Same, posterior view. **308.** Abdomen, anterior view. **309.** Same, lateral view. **310.** Same, posterior view.



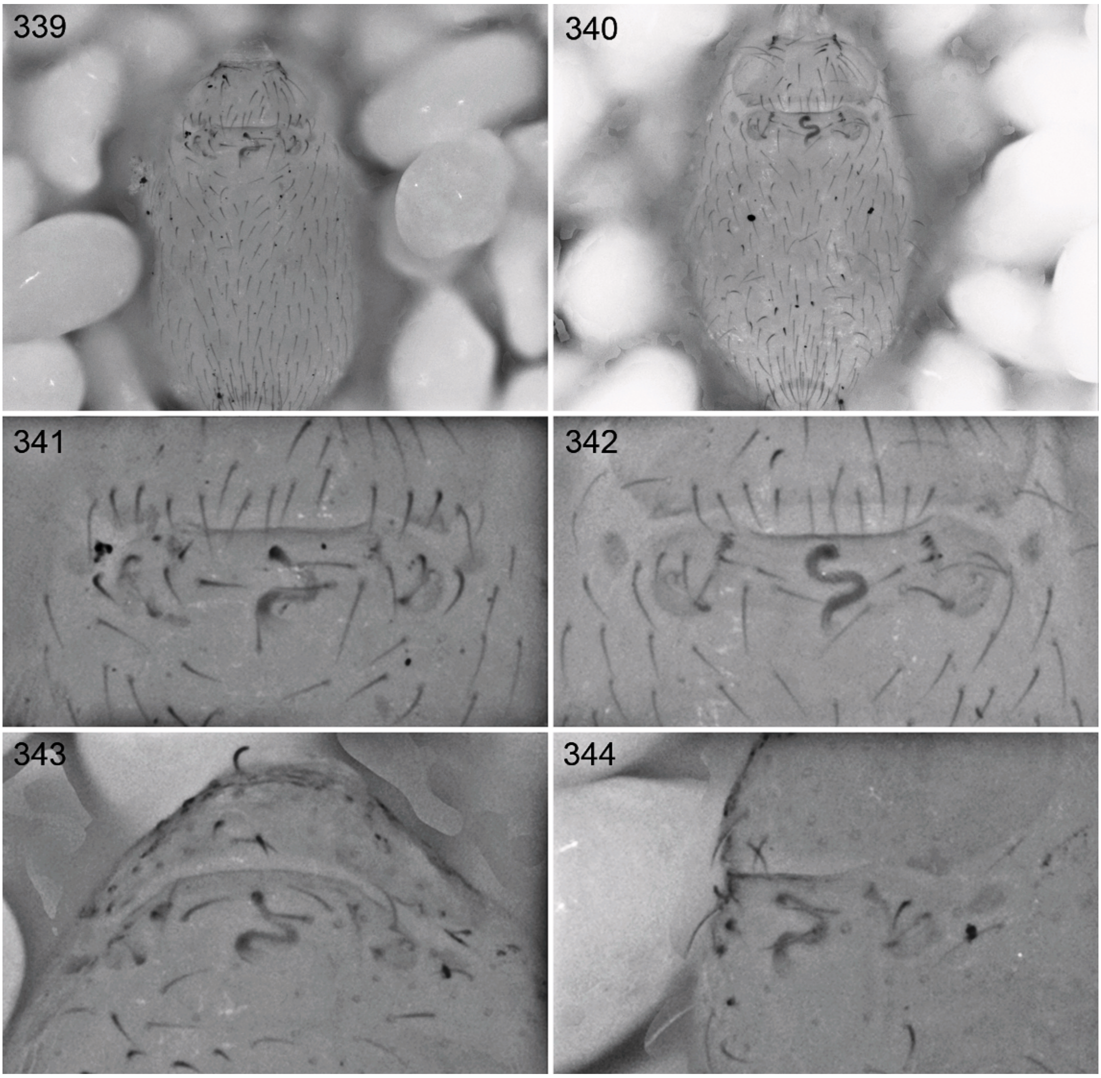
Figs. 311–320. *Malagiella fisheri*, new species, female (PBI_OON 03452). **311.** Habitus, ventral view. **312.** Same, dorsal view. **313.** Same, lateral view. Scale bar = 1 mm. **314.** Abdomen, ventral view. **315.** Cephalothorax, ventral view. **316.** Same, anterior view. **317.** Same, posterior view. **318.** Abdomen, anterior view. **319.** Same, lateral view. **320.** Same, posterior view.



Figs. 321–328. *Malagiella fisheri*, new species, male and female (PBI_OON 03452, except 327 = PBI_OON 03542). **321.** Palp, femur to bulb, prolateral view. **322.** Same, retrolateral view. **323.** Same, dorsal view. **324.** Same, ventral view. **325.** Same, anterior view. **326.** Same, posterior view. **327, 328.** Epigynal region, ventral view.



Figs. 329–338. *Malagiella ranavalona*, new species, female (PBI_OON 03637). **329.** Habitus, ventral view. **330.** Same, dorsal view. **331.** Same, lateral view. Scale bar = 1 mm. **332.** Abdomen, ventral view. **333.** Cephalothorax, ventral view. **334.** Same, anterior view. **335.** Same, posterior view. **336.** Abdomen, anterior view. **337.** Same, lateral view. **338.** Same, posterior view.



Figs. 339–344. *Malagiella ranavalona*, new species, female variation (339, 341, 343, 344: PBI_OON 03637, 340, 342: PBI_OON 03919). **339, 358.** Abdomen, ventral view. **341, 342.** Epigynal region, ventral view. **343.** Same, posterior view. **344.** Same, sublateral view.

collected from sifted leaf litter and 18 from pitfall traps. Females represent most of the sifted specimens (25) and males most of the pitfall specimens (12), in both cases by a factor of 2. This suggests that females are more stationary in favorable litter habitats and that males are more mobile, as would be expected.

SPECIES INCLUDED: *Malagiella ambalavo, M. andringitra*, *M. fisheri*, *M. goodmani*, *M. nikina*, *M. ranavalona*, *M. ranomafana*, *M. toliara*, *M. valterova,* and *M. vohiparara*.

DISTRIBUTION: Known only from Madagascar.

KEY TO THE SPECIES OF *MALAGIELLA*

1. Males (not known for *M. ambalavo*, *M. goodmani*, *M. nikina*, and *M. ranavalona*). . 2
– Females 7
2. Size large, TBL > 1.5; eyes large, PER W = 0.5 cephalon W (fig. 205); color reddish brown; carapace strongly reticulated, forming

rounded cells (fig. 15); abdomen with dorsal and ventral scutes broad, contact zone a sharp, acute indentation (figs. 31, 32, 207, 243, 275, 308); legs III and IV lacking spines. . . . . (*ranomafana* group) 3

– Size smaller, TBL $<$ 1.4; eyes smaller, PER W $<$ 0.4 cephalon W (figs. 350, 435); color orange to yellowish brown; carapace weakly reticulated, forming elongate cells (figs. 117, 118), or smooth (figs. 430, 431); abdomen with dorsal and ventral scutes narrower, contact zone a rounded, broader indentation (figs. 142–146, 352, 353, 437, 438); at least tibia IV with ventroapical spines. 6

3. Sternum lacking long stiff bristles (figs. 323, 474); palpal patella-tibia L $>$ cephalothorax H (figs. 303, 306) . . . . *M. fisheri*

– Sternum with long stiff bristles (figs. 7, 204); palpal patella-tibia L $<$ cephalothorax H (figs. 202, 238, 270) 4

4. Cymbium-bulb larger; about 0.6 patella-tibia L (fig. 482); bulb with dorsal depression at tarsal junction (figs. 288, 289, 294, 295); eyes slightly smaller (fig. 270) . . . *M. andringitra*

– Cymbium-bulb smaller; about 0.5 patella-tibia L (figs. 481, 483); bulb lacking dorsal depression (figs. 481, 483); eyes slightly larger (figs. 202, 238) 5

5. Palpal patella relatively shorter (fig. 481), abdomen with ventral scute slightly shorter (figs. 203, 208, 209) . . . . . . *M. ranomafana*

– Palpal patella relatively longer (fig. 483), abdomen with ventral scute slightly longer (figs. 238, 244, 245) . . . . *M. valterova*

6. Size smaller (TBL $<$ 1.2); DS narrow, about as wide as DS-VS contact zone (figs. 432, 433, 437); VS short, distance from sperm pore to posterior edge shorter than to anterior edge (fig. 432); palpal patella short, patella-tibia L/cymbium-bulb L = 1.3 (fig. 486); tibia III and IV with lateral spines . . . . (*toliara* group) *M. toliara*

– Size larger (TBL 1.2–1.4); DS wider, much wider than DS-VS contact zone (fig. 352); VS long, distance from sperm pore to posterior edge longer than to anterior edge (fig. 358); palpal patella longer, patella-tibia L/cymbium-bulb L = 1.9 (fig. 484); tibia III and IV lacking lateral spines . . . . (*vohiparara* group) *M. vohiparara*

7. Size small, TBL ca 1.3; color yellowish orange; legs III and IV with distinct lateral spines (fig. 471). . (*toliara* group) *M. toliara*

– Size larger, TBL $\geq$ 1.4; color orange to dark brown; legs III and IV lacking lateral spines (figs. 467, 469) 8

8. Tibia IV lacking ventroapical spines (fig. 467); larger darker species with larger eyes, eye area at least 0.5 cephalon width (fig. 283), usually wider (figs. 16, 215, 251, 316), eye area longer than clypeus (figs. 14, 212, 248, 280, 313) . . (*ranomafana* group) 9

– Tibia IV with a pair of small ventroapical spines (fig. 469); smaller paler species with smaller eyes, eye area less than 0.5 cephalon width (figs. 123, 334), eye area as long as clypeus (fig. 121); eyes somewhat larger in *M. nikina*, which has an eye row approaching 0.5 cephalon width (fig. 394) . . . . (*vohiparara* group) 12

9. DS small, L $<$ 0.7 abdomen L, W $<$ 0.6 abdomen W (figs. 279, 280); receptaculum relatively straight in ventral view (figs. 296–298) . . . . *M. andringitra*

– DS large, L $>$ 0.8 abdomen L, W $>$ 0.7 abdomen W (figs. 211, 247, 312); receptaculum curvature variable (figs. 228–235, 264–267, 327, 328) 10

10. Receptaculum nearly straight in ventral view, W/L $<$ 0.3 (map 4); posterior margin of PES procurved (figs. 328, 329). . . . . . *M. fisheri*

– Receptaculum more strongly sinuous, W/L $>$ 0.3 (map 4); posterior margin of PES straight (figs. 228–235, 264–267) 11

11. Receptaculum more sinuous, W/L = 0.7 (figs. 264–267); DS with anterior margin broad (fig. 253) . . . . *M. valterova*

– Receptaculum less sinuous, W/L = 0.3–0.5 (figs. 228–235); DS with anterior margin pointed (fig. 217). . . . . *M. ranomafana*

12. Receptaculum relatively straight, W/L $<$ 0.4 (map 4) 13

– Receptaculum sinuous, W/L $>$ 0.7 (map 4) 14

13. Receptaculum slender and somewhat sinuous (figs. 403–410); larger size, TBL = 1.48–1.64; larger eyes, eye area about 0.5 cephalon width (fig. 394). . . . . *M. nikina*

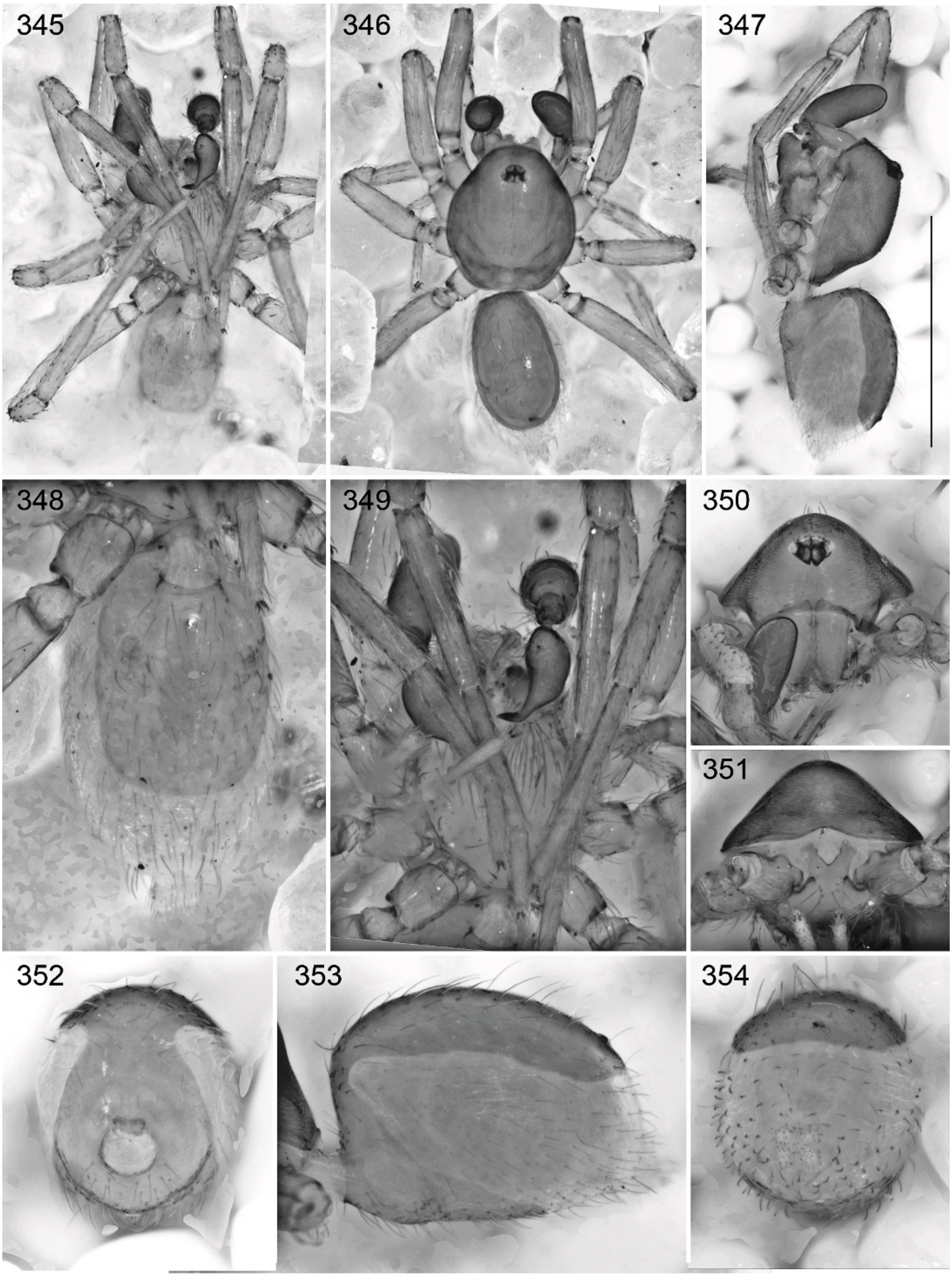
– Recepataculum stout and very straight (figs. 421–428); smaller size, TBL = 1.40–1.48; smaller eyes, eye area clearly less that 0.5 cephalon width (figs. 412, 416) . . . . *M. goodmani*

14. DS small, about 0.3 abdomen width, 0.5 abdomen length (fig. 330); receptaculum moderately sinuous, W/L =0.76 (figs. 339–344) . . . . *M. ranavalona*

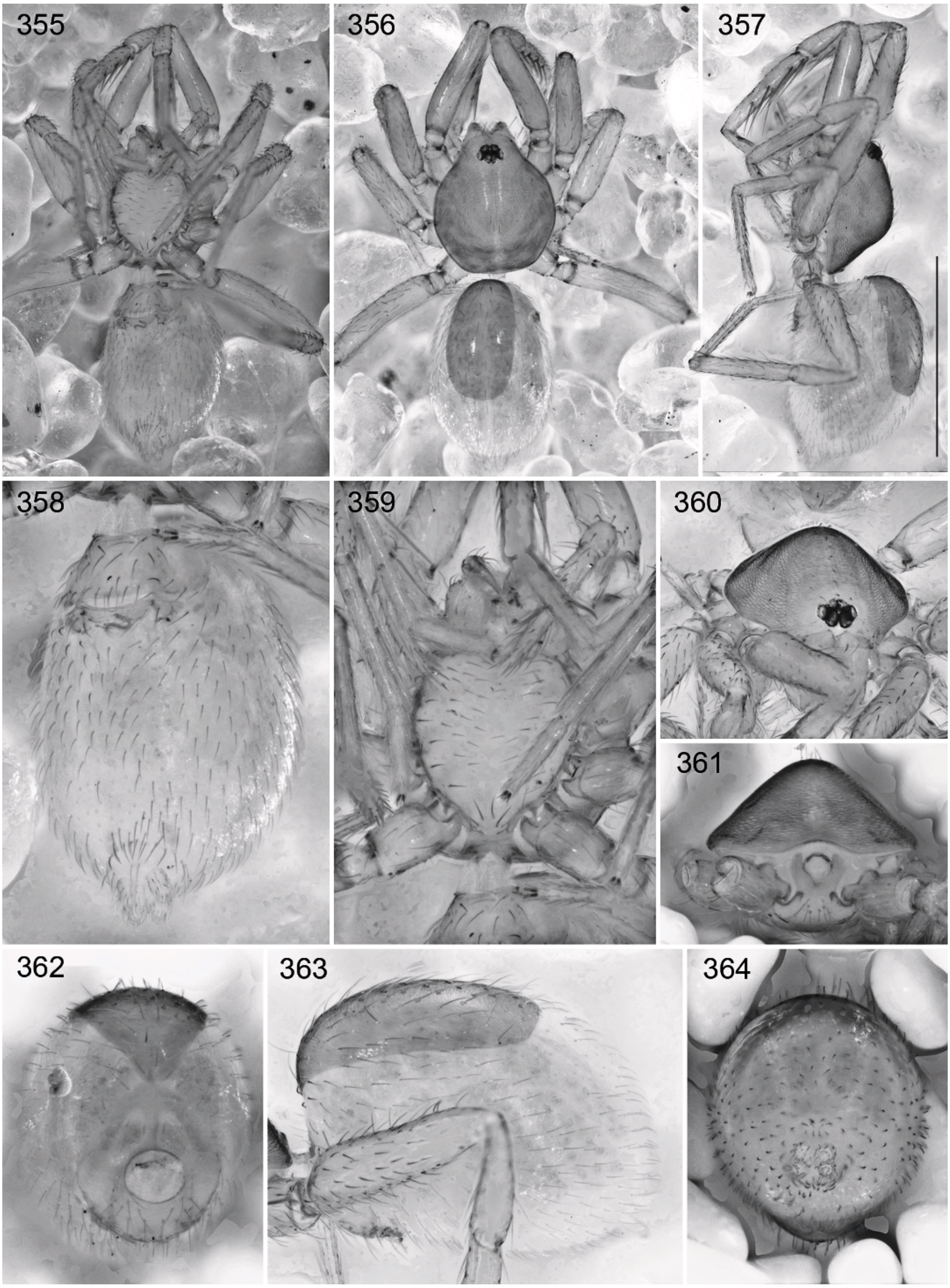
– DS larger, about 0.5 abdomen width, 0.7 abdomen length (figs. 356, 380); receptaculum strongly sinuous, W/L = 0.9–1.2 (figs. 373–378, 389–392) 15

15. Receptaculum more sinuous, W/L = 1.0–1.2 (figs. 373–378). . . . . *M. vohiparara*

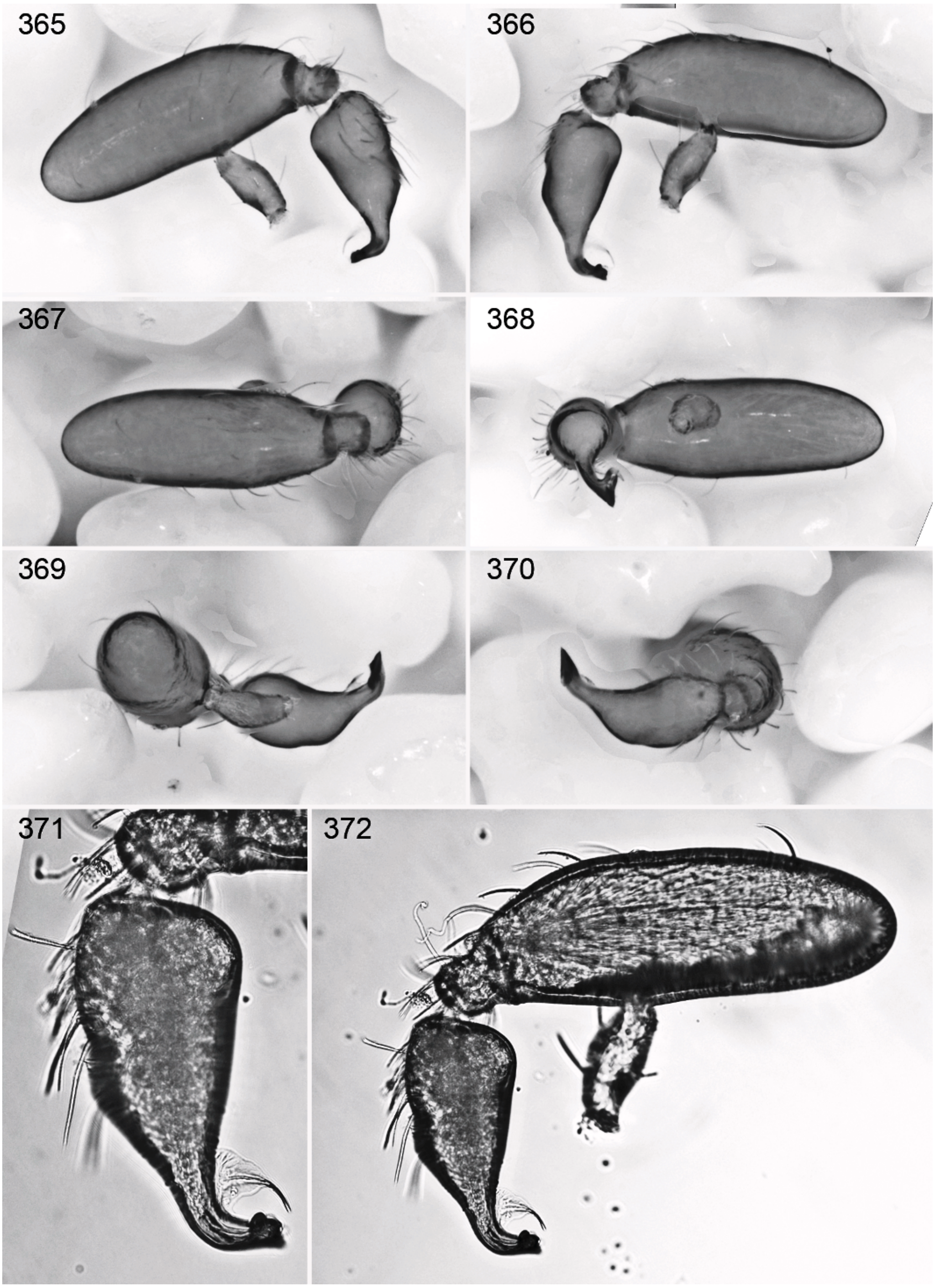
– Receptaculum less sinuous, W/L = 0.9 (figs. 389–392). . . . . *M. ambalavo*



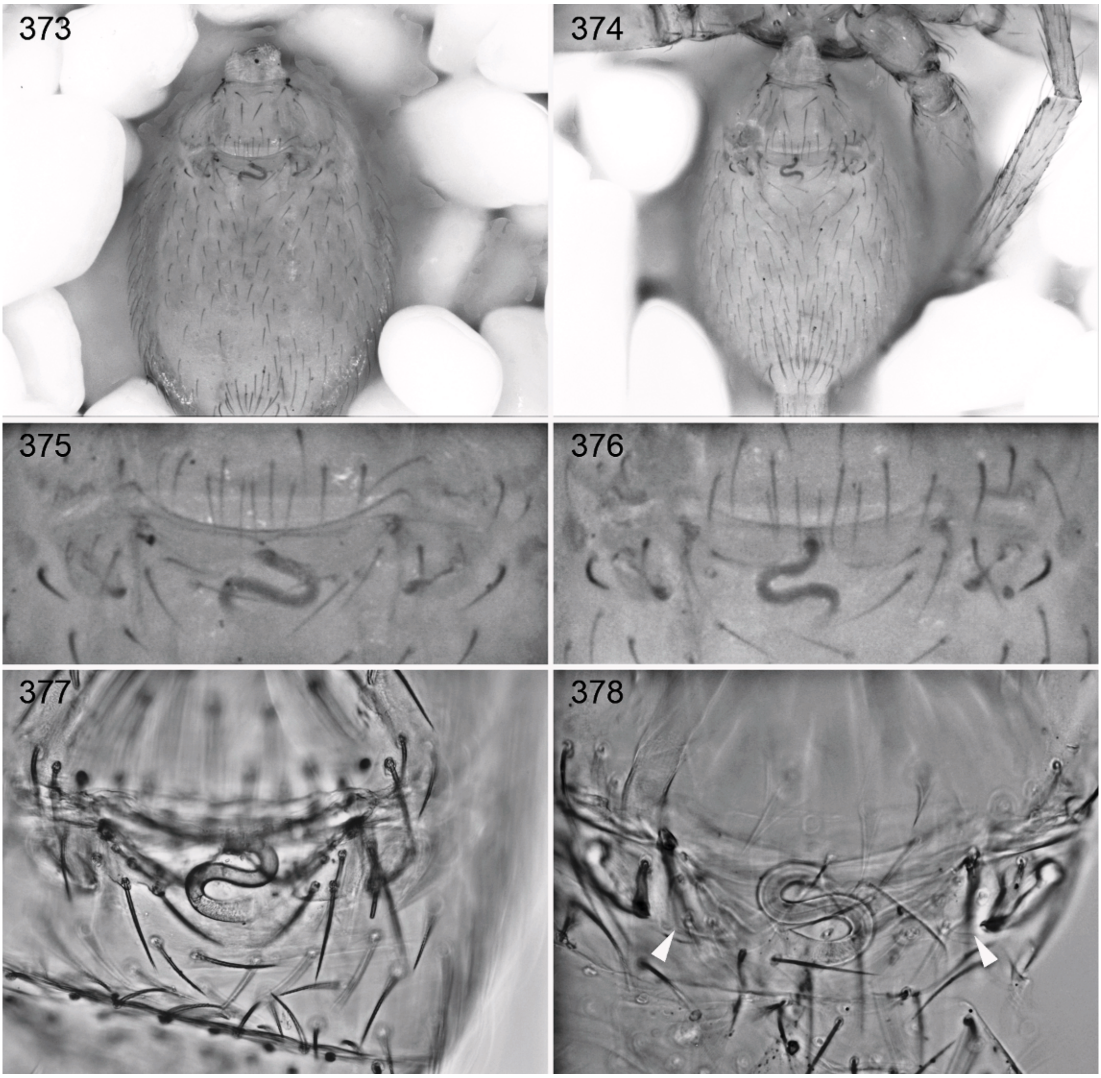
Figs. 345–354. *Malagiella vohiparara*, new species, male (PBI_OON 03078). **345.** Habitus, ventral view. **346.** Same, dorsal view. **347.** Same, lateral view. Scale bar = 1 mm. **348.** Abdomen, ventral view. **349.** Cephalothorax, ventral view. **350.** Same, anterior view. **351.** Same, posterior view. **352.** Abdomen, anterior view. **353.** Same, lateral view. **354.** Same, posterior view.



Figs. 355–364. *Malagiella vohiparara*, new species, female (PBI_OON 03078). **355.** Habitus, ventral view. **356.** Same, dorsal view. **357.** Same, lateral view. Scale bar = 1 mm. **358.** Abdomen, ventral view. **359.** Cephalothorax, ventral view. **360.** Same, anterior view. **361.** Same, posterior view. **362.** Abdomen, anterior view. **363.** Same, lateral view. **364.** Same, posterior view.



Figs. 365–372. *Malagiella vohiparara*, new species, male (PBI_OON 03078). **365.** Palp, femur to bulb, prolateral view. **366.** Same, retrolateral view. **367.** Same, dorsal view. **368.** Same, ventral view. **369.** Same, anterior view. **370.** Same, posterior view. **371.** Bulb, retrolateral view. **372.** Palp, retrolateral view.



Figs. 373–378. *Malagiella vohiparara*, new species, female variation (PBI_OON 03078; 373, 375, 377, 378: specimen 1; 374, 376: specimen 2). **373, 374.** Abdomen, ventral view. **375, 376.** Epigynal area, ventral view. **377.** Same, cleared specimen. **378.** Same, dorsal view with arrows to apodemes.

Malagiella ranomafana species group

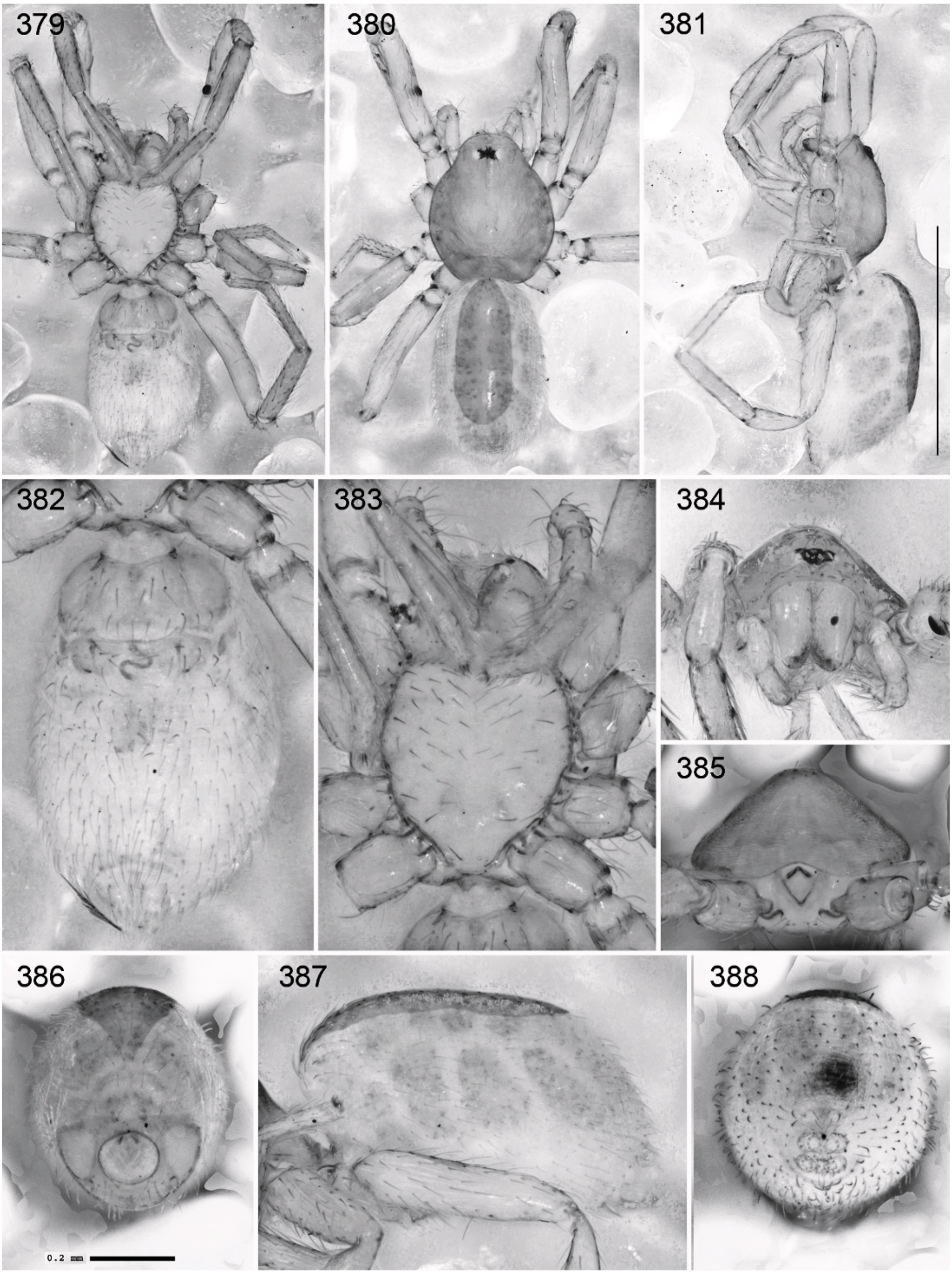
DIAGNOSIS: Members of this group are large reddish brown species with prominent carapace reticulation (figs. 13–18) and an absence of spines on the hind legs (fig. 467). Eyes are large, with PER width about 0.5 cephalon width (figs. 15, 16) and eye area length subequal to clypeus in males (fig. 14) or greater than clypeus length in females (fig. 18). Male abdomen with dorsal and ventral scutes broad (fig. 201), with contact zone acutely indented (figs. 207, 208).

SPECIES INCLUDED: *Malagiella andringitra*, *M. fisheri*, *M. ranomafana,* and *M. valterova.*

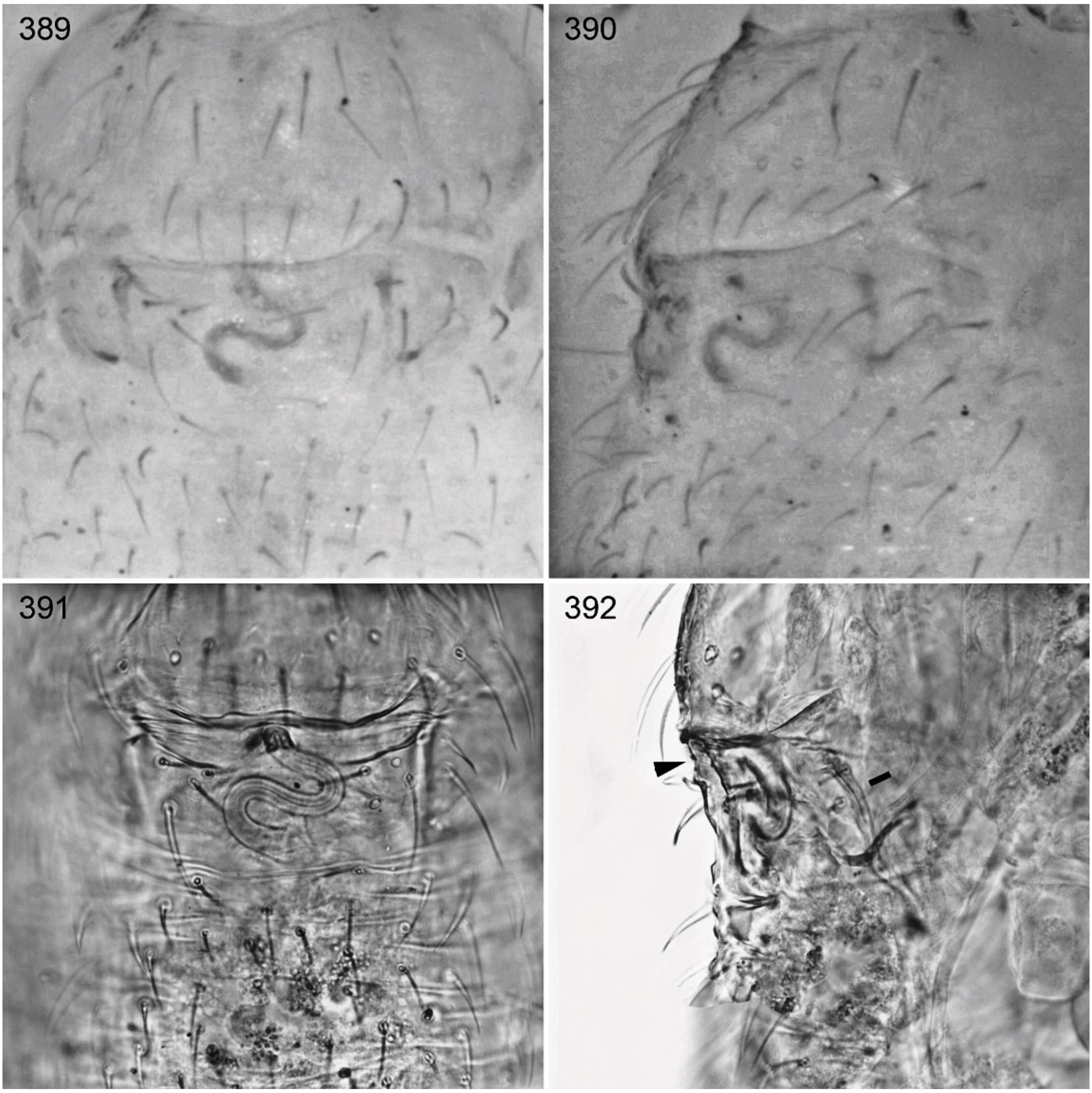
Malagiella ranomafana, new species

Figures 7–116, 200–235, 463, 466, 467, 475, 478, 481, 487; maps 1–4; table 1

TYPE: Male holotype, female allotype, and female paratype from Talatakely, P.N. Ra-



Figs. 379–388. *Malagiella ambalavo*, new species, female (PBI_OON 03223). **379.** Habitus, ventral view. **380.** Same, dorsal view. **381.** Same, lateral view. Scale bar = 1 mm. **382.** Abdomen, ventral view. **383.** Cephalothorax, ventral view. **384.** Same, anterior view. **385.** Same, posterior view. **386.** Abdomen, anterior view. **387.** Same, lateral view. **388.** Same, posterior view.



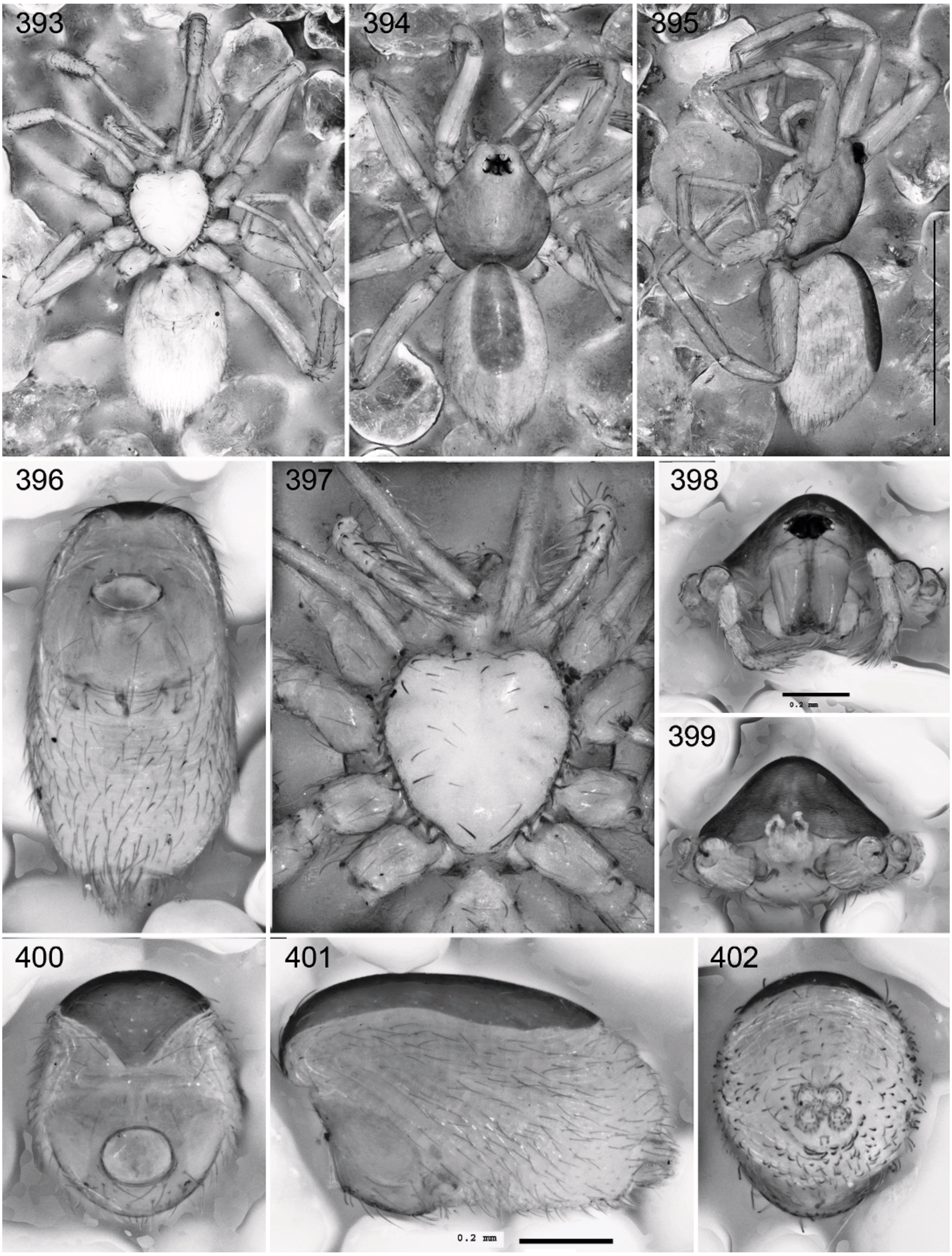
Figs. 389–392. *Malagiella ambalavo*, new species, female (PBI_OON 03223). **389.** Epigynal region, ventral view. **390.** Same, sublateral view. **391.** Ventral view, cleared. **392.** Lateral view, cleared showing copulatory opening (arrow) and apodeme (dash).

nomafana, 21°15′S, 47°25′E, 900 m, Fianarantsoa Province, Madagascar (5–7 Dec 1993, N. Scharff, S. Larcher, C. Griswold, R. Andriamasimanana), deposited in CAS (CASENT 9029645, PBI_OON 03225).

ETYMOLOGY: The species is named after the type locality.

DIAGNOSIS: The male may be distinguished from other species in the group by the combination of sternum strongly bristly, bulb-cymbium small (about 0.5 patella-tibia length), and a palpal patella of moderate size (fig. 481). The female differs by the combination of large dorsal scutum, PES with straight posterior margin, and receptaculum moderately sinuous (W/L = 0.3–0.5) (figs. 228–235).

MALE (PBI_OON 03225): Total length 1.70 (1.56–1.70), carapace length 0.80 (0.78–0.80), width 0.64 (0.62–0.66), N = 12.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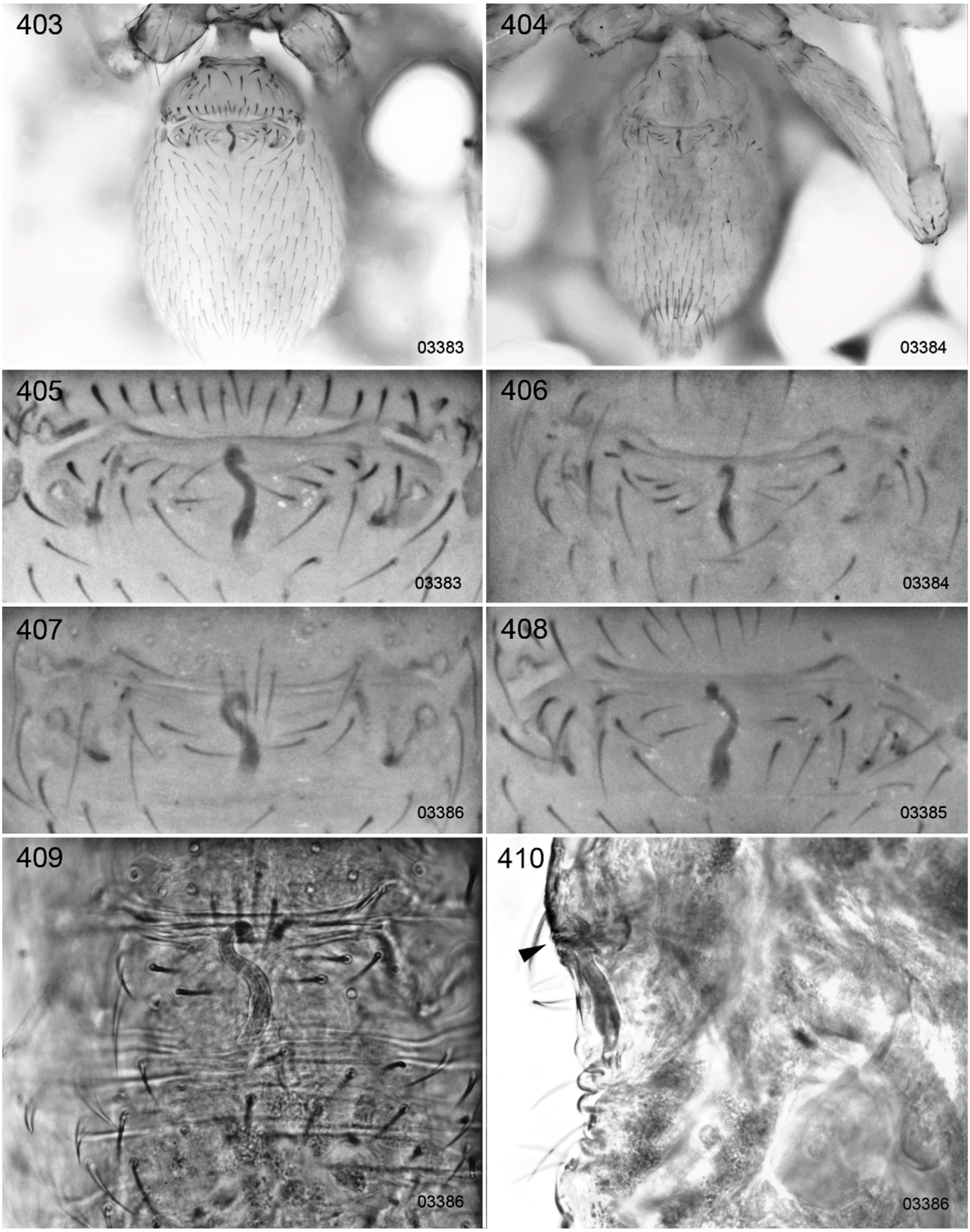
Figs. 393–402. *Malagiella nikina*, new species, female (PBI_OON 03384: 393–395, 397; PBI_OON 03386: 396, 398–402). **393.** Habitus, ventral view. **394.** Same, dorsal view. **395.** Same, lateral view. Scale bar = 1 mm. **396.** Abdomen, ventral view. **397.** Cephalothorax, ventral view. **398.** Same, anterior view. **399.** Same, posterior view. **400.** Abdomen, anterior view. **401.** Same, lateral view. **402.** Same, posterior view.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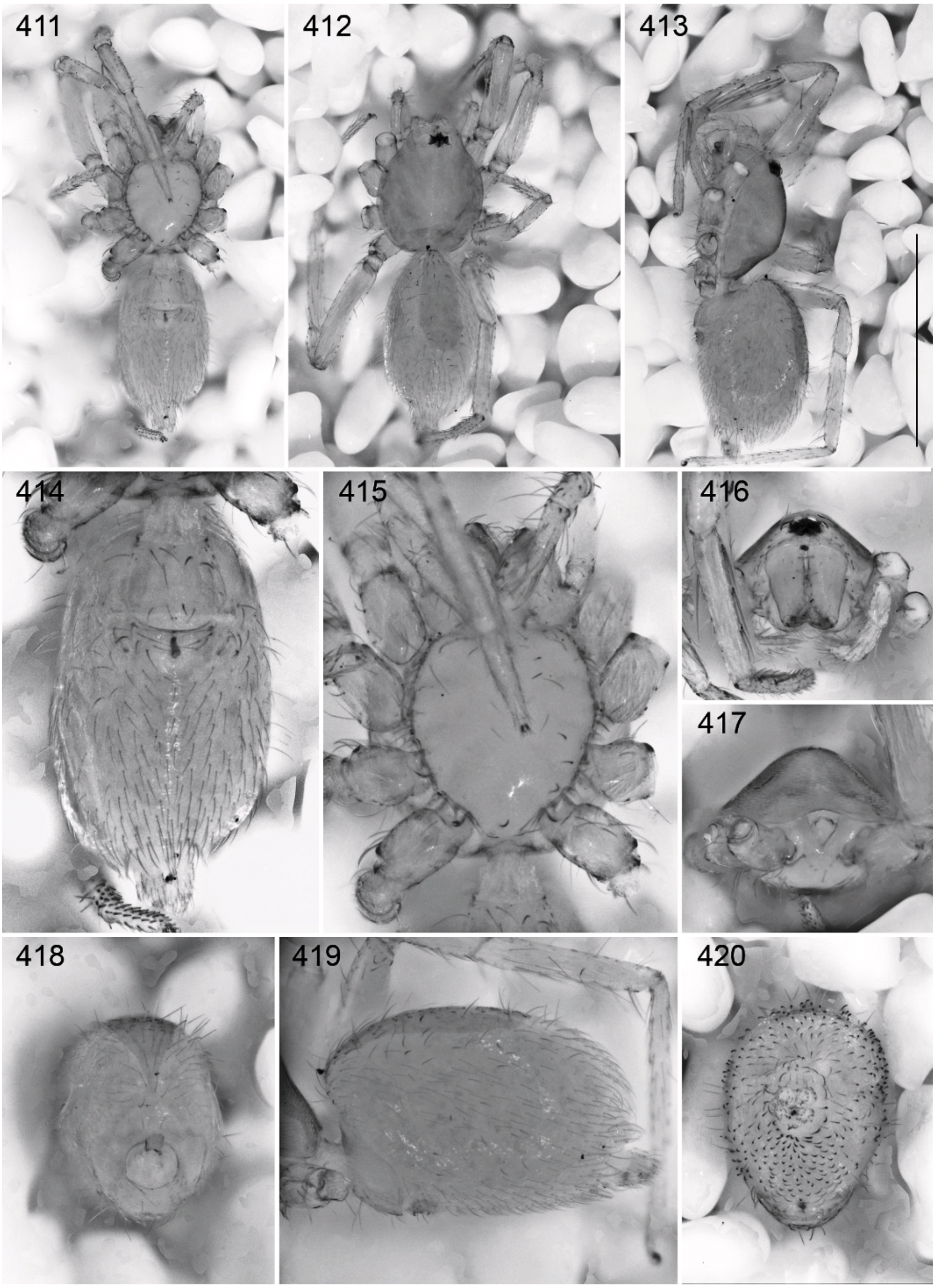
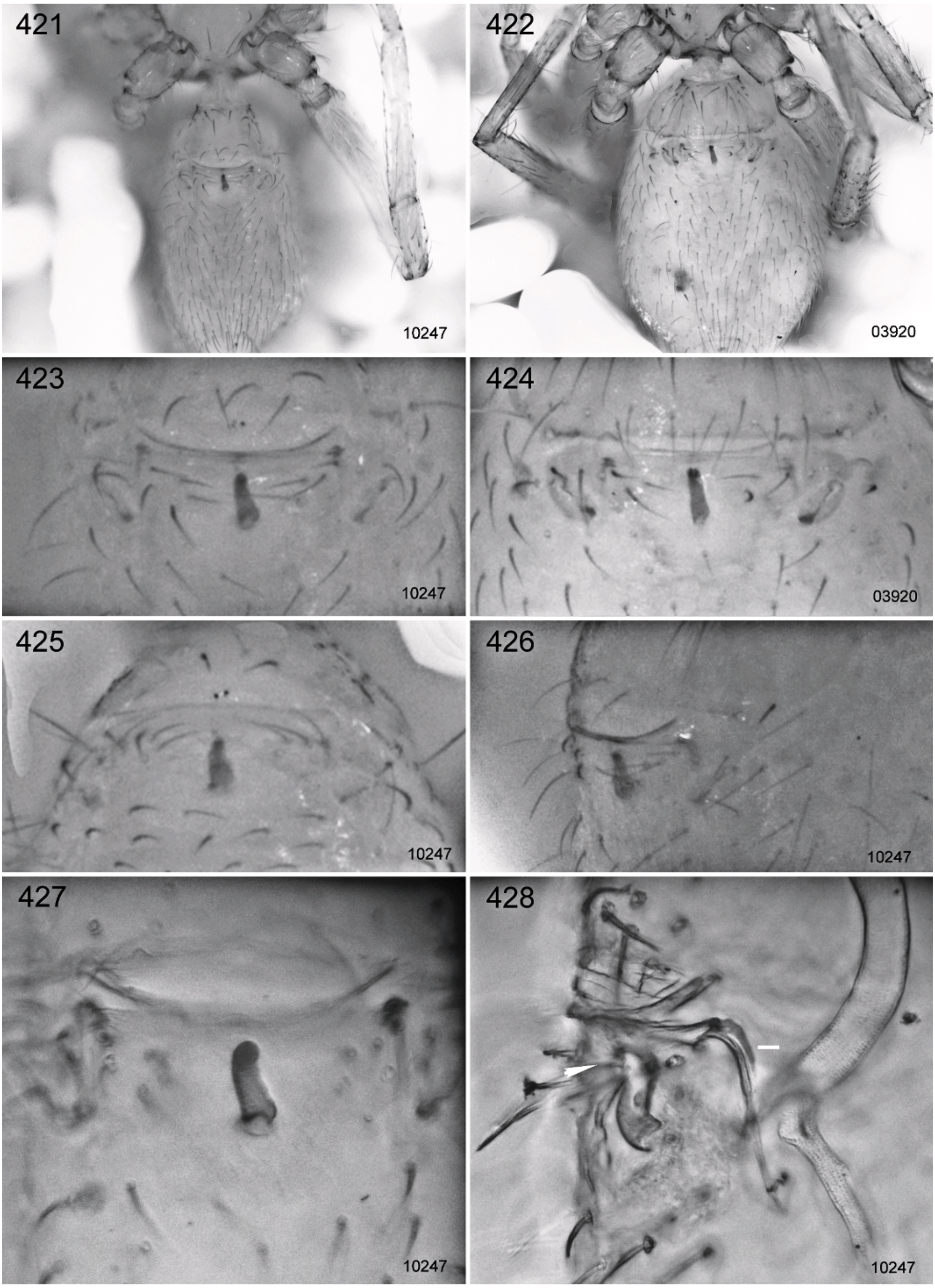
Figs. 403–410. *Malagiella nikina*, new species, female variation (PBI_OON numbers on figs.). **403, 404.** Abdomen, ventral view. **405–408.** Epigynal region, ventral view. **409.** Same, cleared. **410.** Same, lateral view, with arrow to copulatory opening.



Figs. 411–420. *Malagiella goodmani*, new species, female (PBI_OON 10247). **411.** Habitus, ventral view. **412.** Same, dorsal view. **413.** Same, lateral view. Scale bar = 1 mm. **414.** Abdomen, ventral view. **415.** Cephalothorax, ventral view. **416.** Same, anterior view. **417.** Same, posterior view. **418.** Abdomen, anterior view. **419.** Same, lateral view. **420.** Same, posterior view.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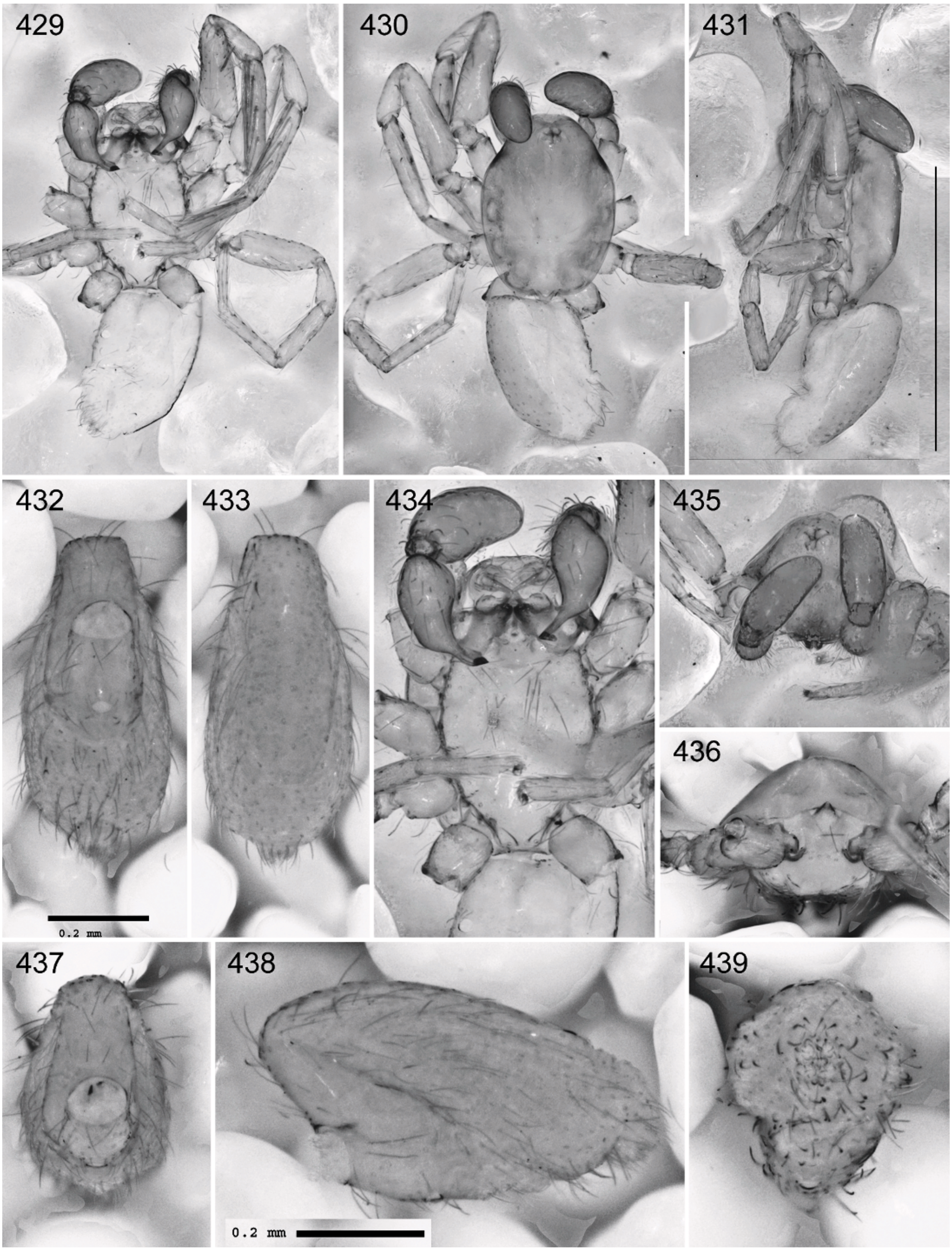
Figs. 421–428. *Malagiella goodmani*, new species, female variation (PBI_OON numbers on figs.). **421, 422.** Abdomen, ventral view. **423, 424.** Epigynal region, ventral view. **425.** Same, posterior view. **426.** Same, lateral view. **427.** Epigynal area cleared, ventral view. **428.** Same, lateral view, showing copulatory opening (arrow) and apodeme (dash).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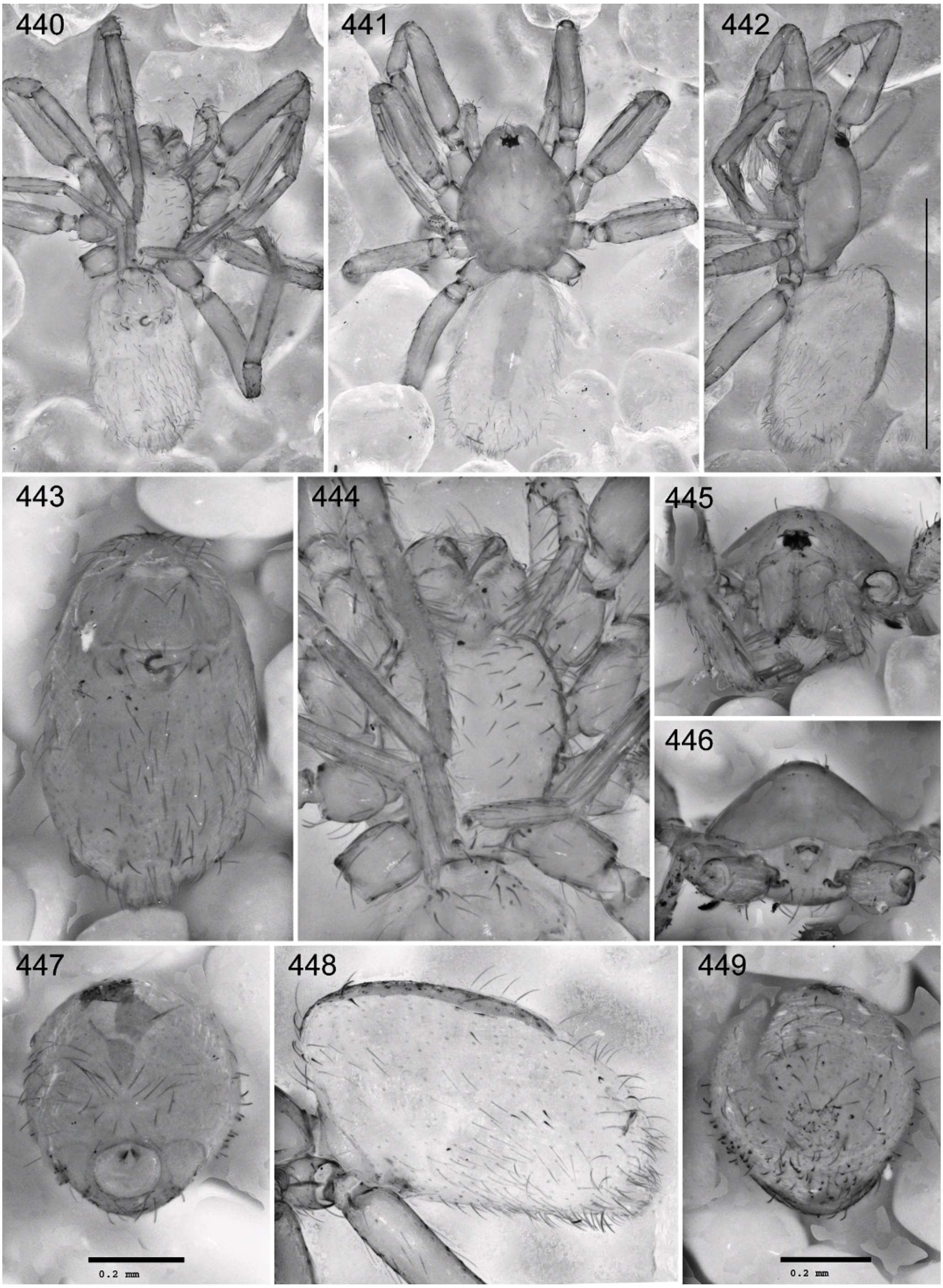
Figs. 429–439. *Malagiella toliara*, new species, male (PBI_OON 03221: 429–431, 434, 435; PBI_OON 03377: 432, 433, 436–439). **429.** Habitus, ventral view. **430.** Same, dorsal view. **431.** Same, lateral view. Scale bar = 1 mm. **432.** Abdomen, ventral view. **433.** Same, dorsal view. **434.** Cephalothorax, ventral view. **435.** Same, anterior view. **436.** Same, posterior view. **437.** Abdomen, anterior view. **438.** Same, lateral view. **439.** Same, posterior view.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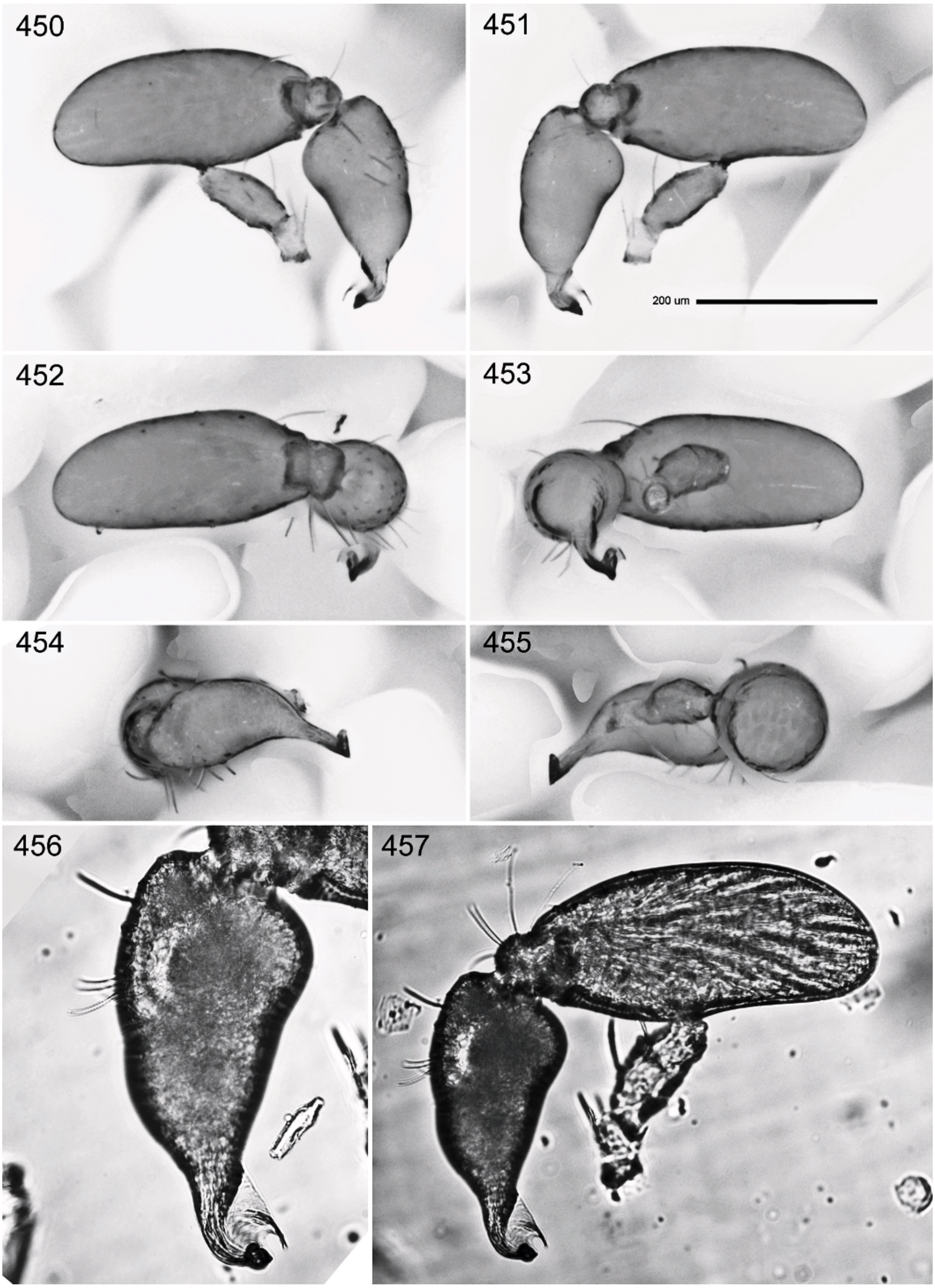
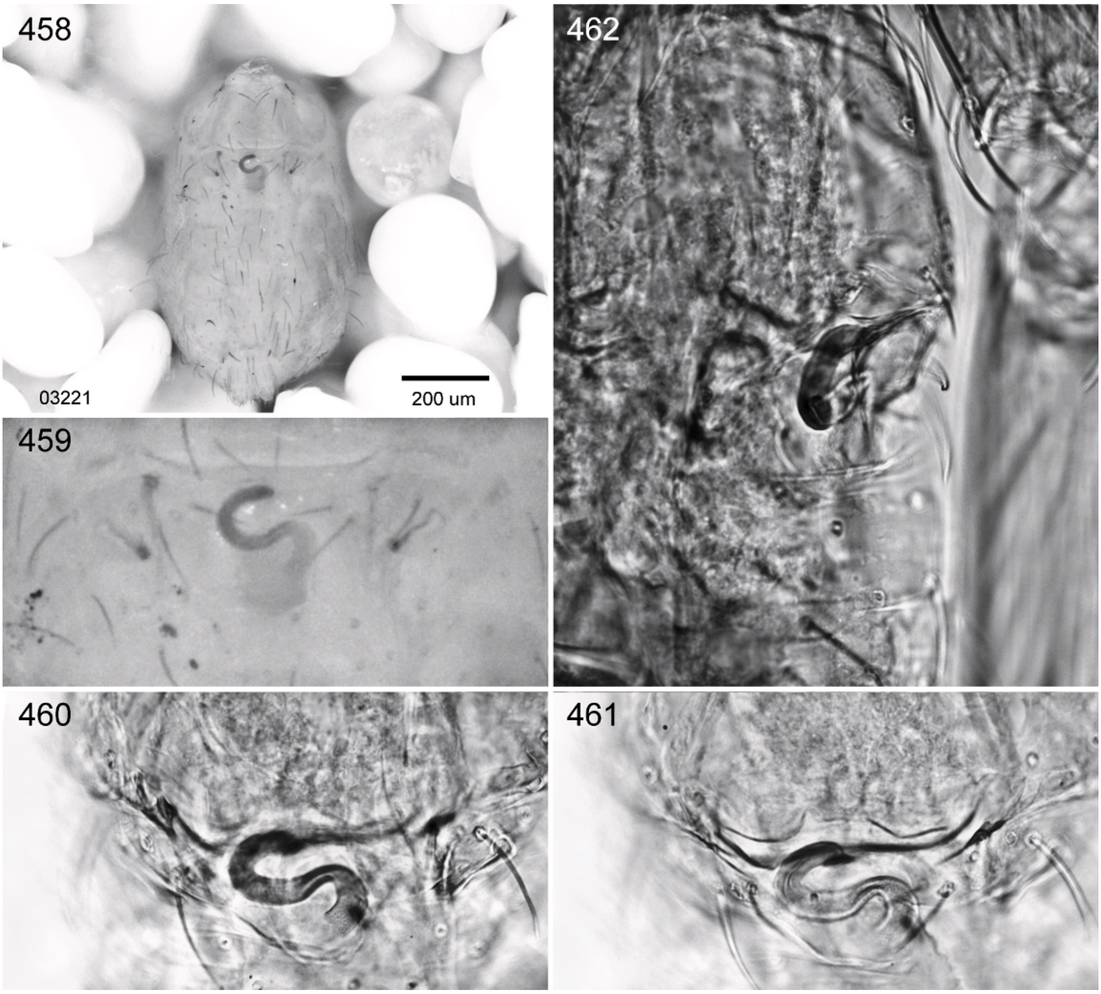
Figs. 440–449. *Malagiella toliara*, new species, female (PBI_OON 03221). **440.** Habitus, ventral view. **441.** Same, dorsal view. **442.** Same, lateral view. Scale bar = 1 mm. **443.** Abdomen, ventral view. **444.** Cephalothorax, ventral view. **445.** Same, anterior view. **446.** Same, posterior view. **447.** Abdomen, anterior view. **448.** Same, lateral view. **449.** Same, posterior view.

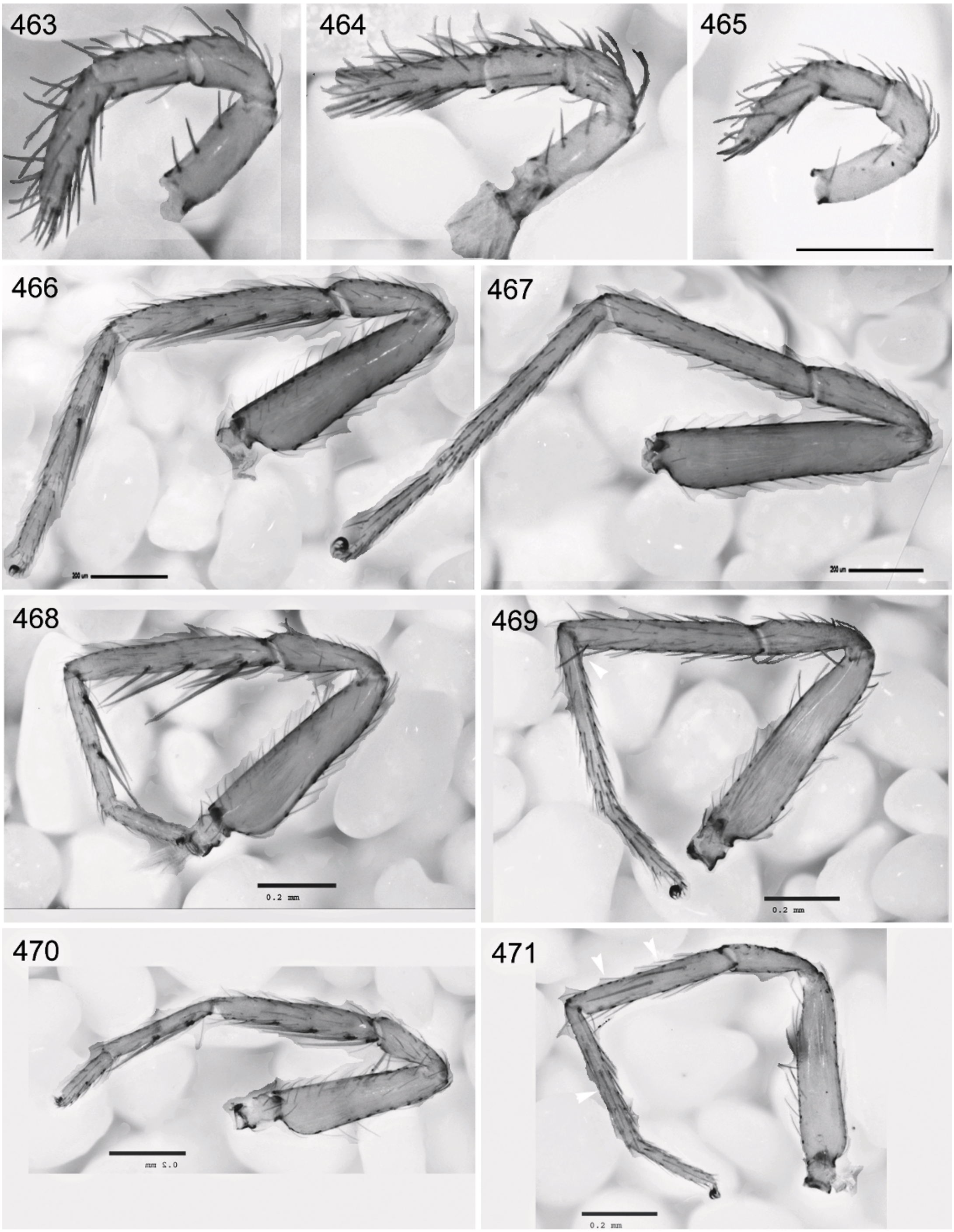


Figs. 450–457. *Malagiella toliara*, new species, male (PBI_OON 03377). **450.** Palp, femur to bulb, prolateral view. **451.** Same, retrolateral view. **452.** Same, dorsal view. **453.** Same, ventral view. **454.** Same, anterior view. **455.** Same, posterior view. **456.** Bulb, retrolateral view. **457.** Palp, retrolateral view.



Figs. 458–462. *Malagiella toliara*, new species, female (PBI_OON 03221). **458.** Abdomen, ventral view. **459.** Epigynal area, ventral view. **460.** Same, cleared specimen. **461.** Same, different focal plane. **462.** Same, lateral view.

CEPHALOTHORAX: Carapace ovoid in dorsal view, pars cephalica slightly elevated in lateral view, anteriorly narrowed to about 0.55 times its maximum width; lateral margin strongly undulate (fig. 14). Eye area width 0.5 carapace width, length 1.2 clypeus length (figs. 13–15). Sternum lateral margin infracoxal grooves present, with anterior and posterior openings (fig. 19). Mouthparts: Cheliceral paturon posterior surface with a row of three long setae (fig. 19); with promarginal tooth and denticles on both margins (fig. 25). Endite with median lobe bearing dense scopula and lateral lobe with serrula and three stout setae (figs. 26, 27). ABDOMEN: Pedicel tube of medium length (fig. 208), dorsal extension of epigastric scute about one pedicel diameter (fig. 207). Spinnerets: ALS with three subequal spigots; PMS with two subequal spigots; PLS with four subequal spigots (figs. 40–43). LEGS: Tarsi I–IV superior claws examined in detail: tarsal proclaws and retroclaws with faces striate; tarsi I, II superior claws with three large teeth on lateral surfaces and three small teeth on median surfaces of both proclaw and retroclaw; tarsi III, IV superior claws with three teeth on lateral surfaces of proclaw and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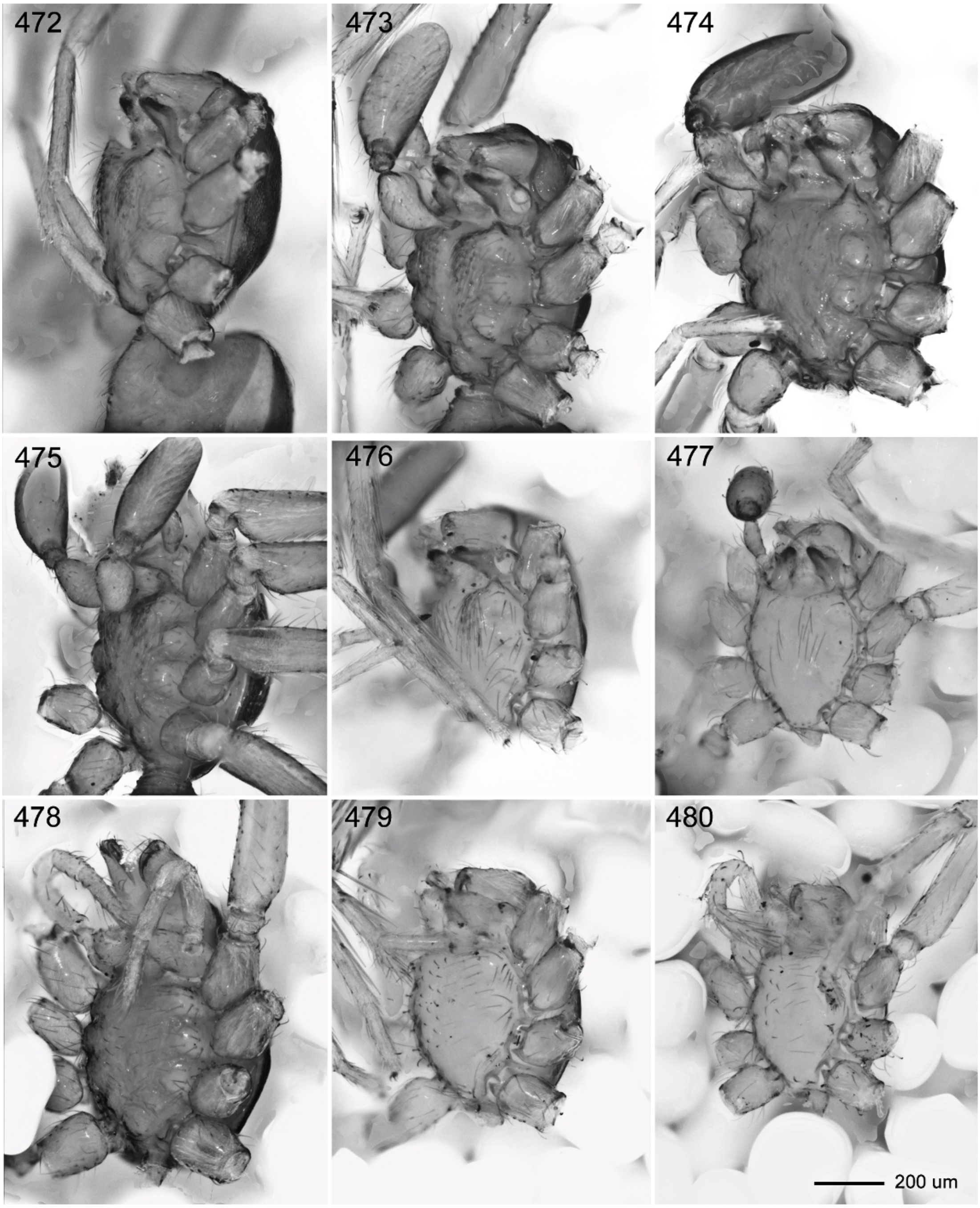
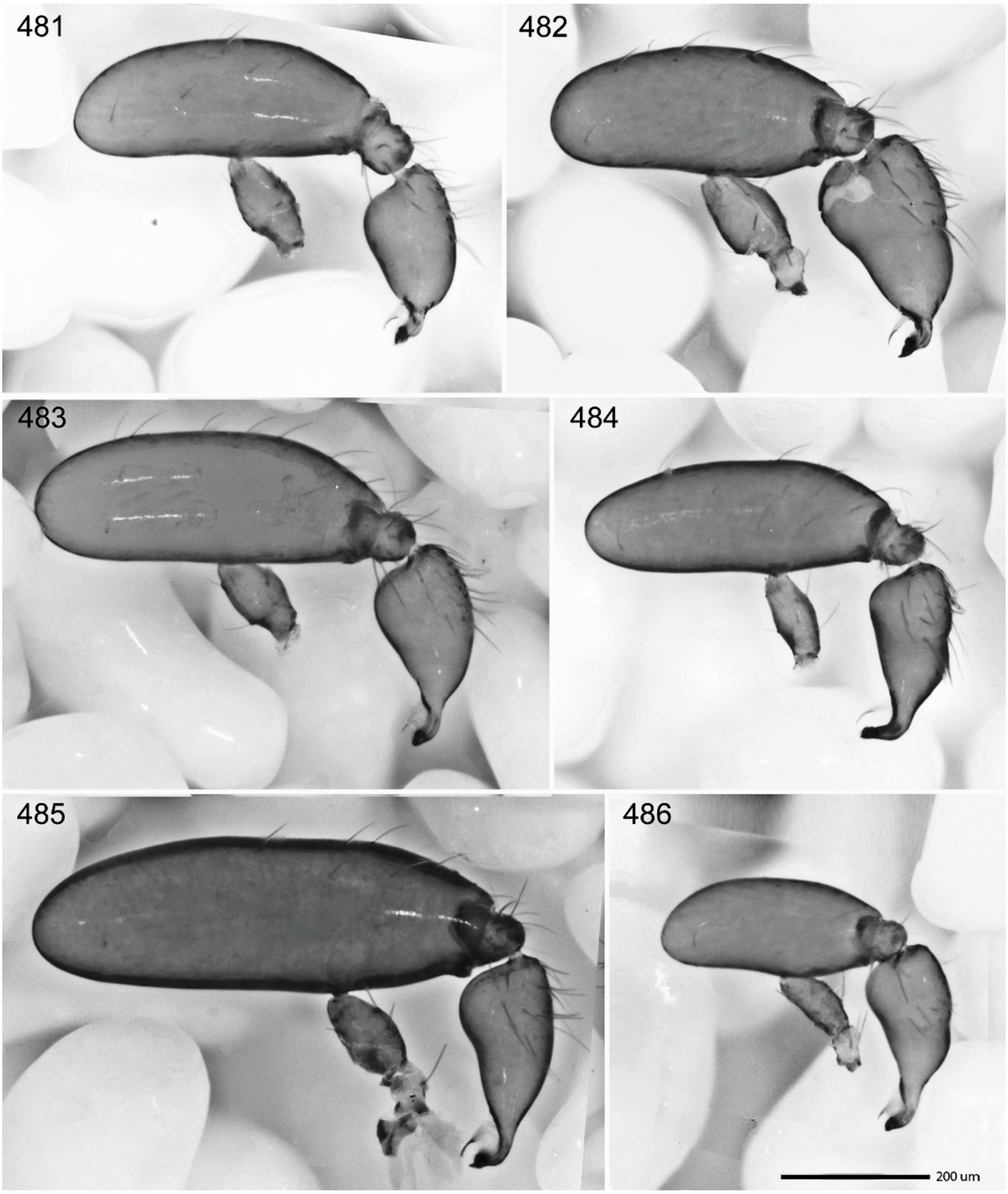
Figs. 463–471. *Malagiella* species, female palpi and legs. *M. ranomafana* (PBI_OON 03227): 463, 466, 467; *M. vohiparara* (PBI_OON 03078): 464, 468, 469; *M. toliara* (PBI_OON 03221): 465, 470, 471. **463–465.** Palp, retrolateral view. **466, 468, 470.** Leg I, retrolateral view. **467, 469, 471.** Leg IV, retrolateral view showing leg spines (arrows). Scale bars = 200 μm.



Figs. 472–480. *Malagiella* species, sternum, ventrolateral view, males (472–477) and females (478–480). **472.** *M. andringitra*, PBI_OON 03234. **473.** *M. valterova*, PBI_OON 03461. **474.** *M. fisheri*, PBI_OON 03452. **475.** *M. ranomafana*, PBI_OON 01999. **476.** *M. vohiparara*, PBI_OON 03078. **477.** *M. toliara*, PBI_OON 03377. **478.** *M. ranomafana*, PBI_OON 01999. **479.** *M. vohiparara*, PBI_OON 03078. **480.** *M. toliara*, PBI_OON 03221.



Figs. 481–486. *Malagiella* species, male palpus, femur to bulb, prolateral view. **481.** *M. ranomafana*, PBI_OON 03224. **482.** *M. andringitra*, PBI_OON 03234. **483.** *M. valterova*, PBI_OON 03461. **484.** *M. vohiparara*, PBI_OON 03078. **485.** *M. fisheri*, PBI_OON 03452. **486.** *M. toliara*, PBI_OON 03377. Scale bar (200 µm) applies to all palpi.

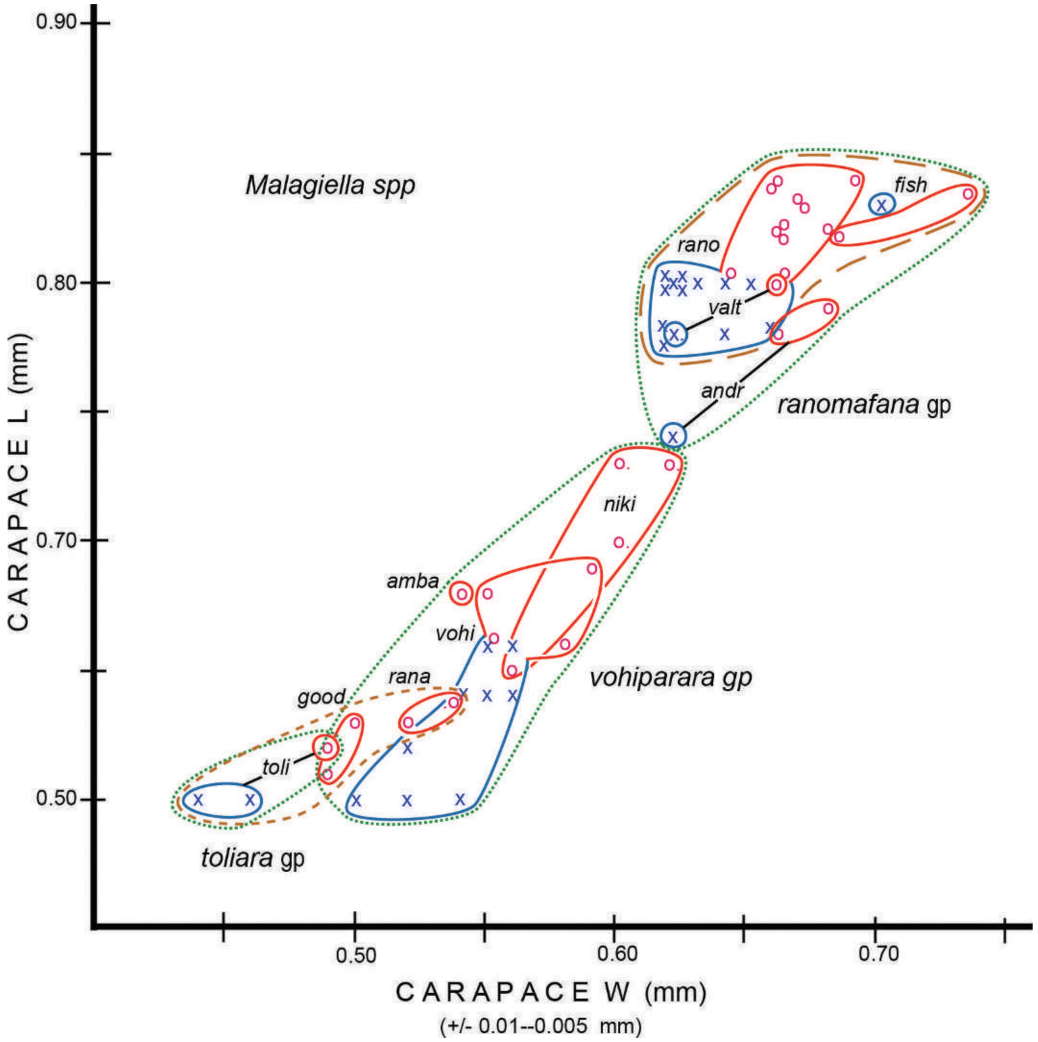
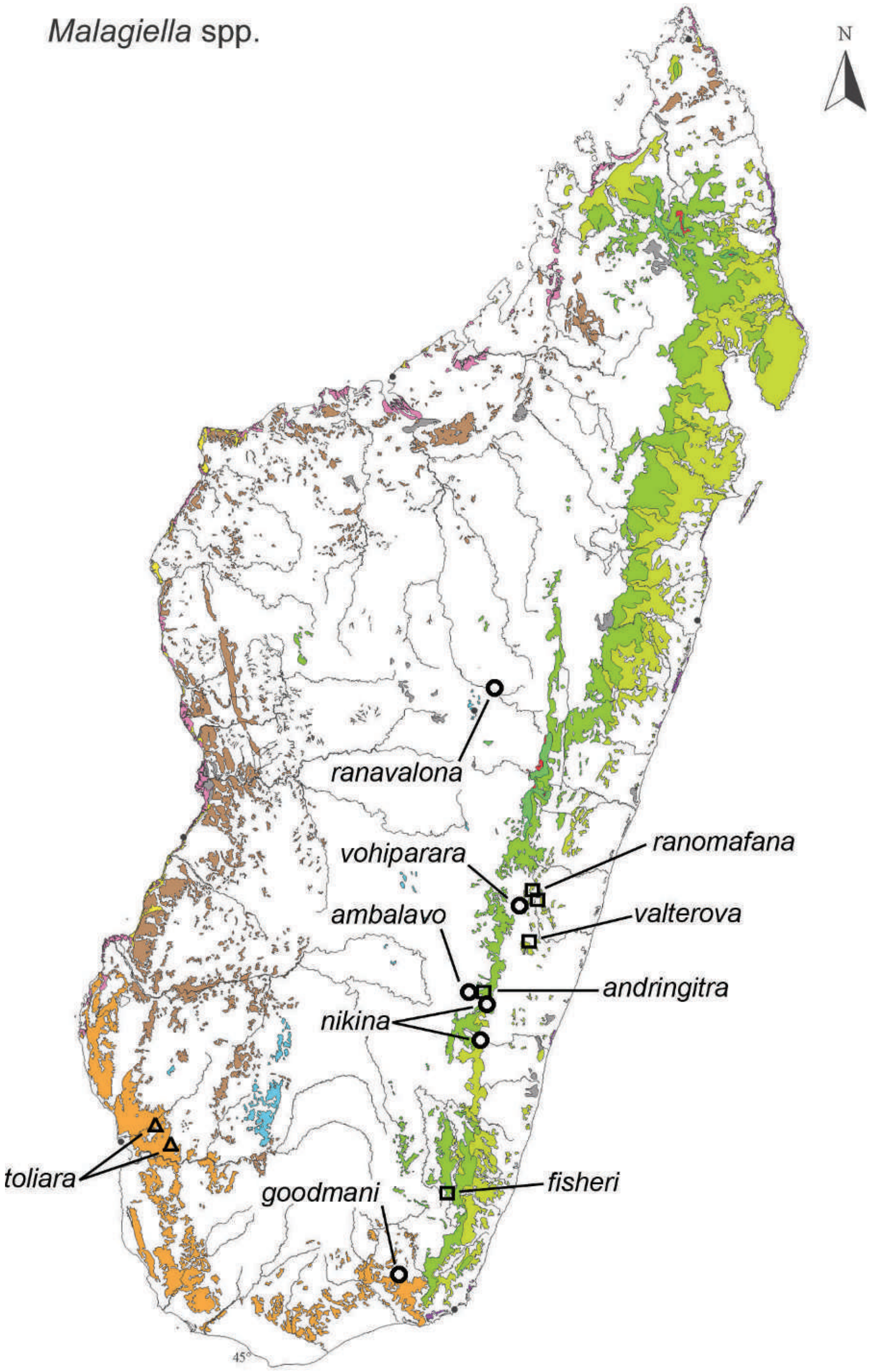
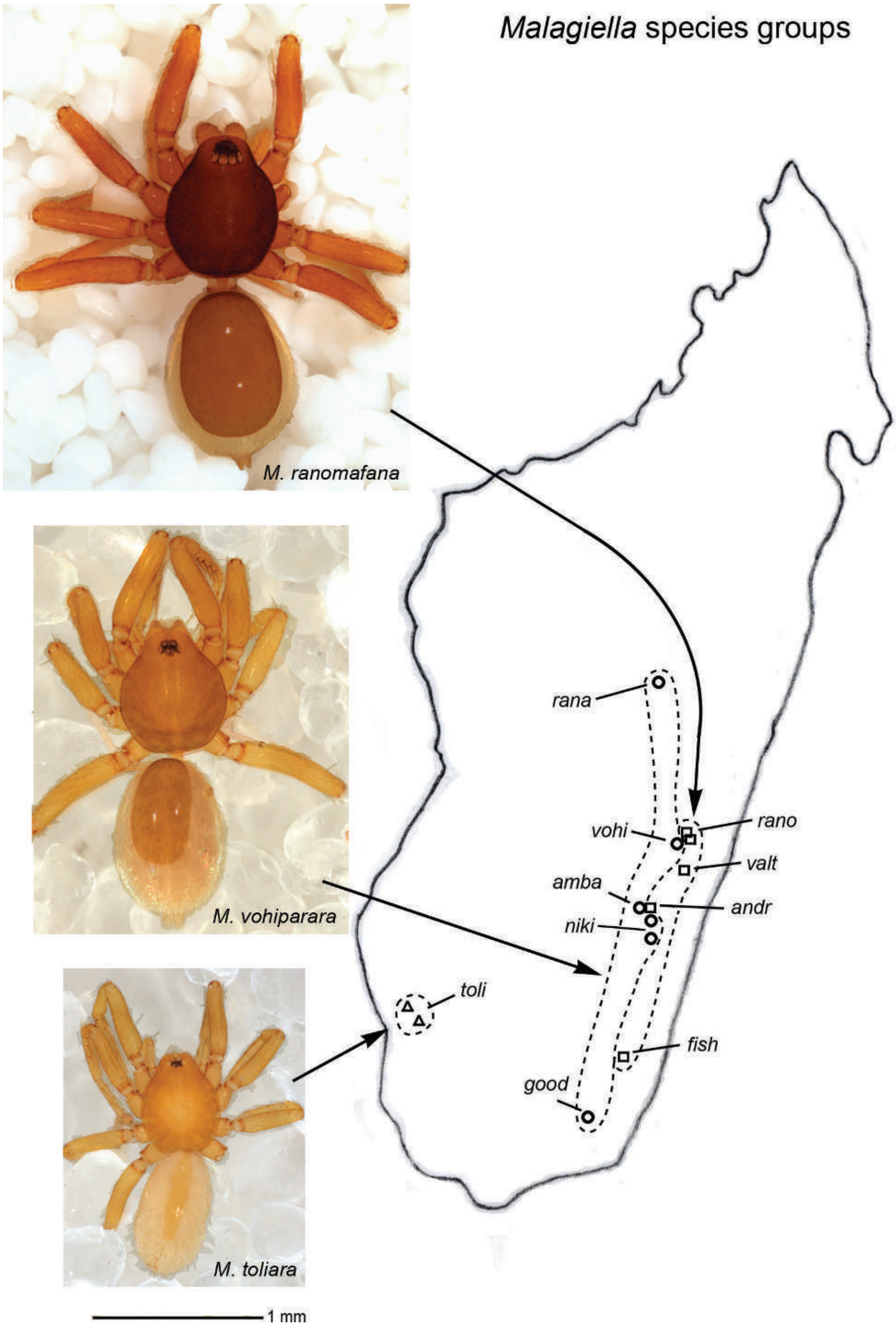


Fig. 487. Size variation in *Malagiella* measured as a function of carapace length to carapace width. Plot is based on measurements of 26 male specimens ("x") and 30 female specimens ("o"). Blue lines enclose male values for a given species and red lines female values; disjunct conspecific readings are connected by straight lines. Green dotted lines enclose the three species groups. Brown dashed lines refer to the size of female DS, with the large dashes (upper right) enclosing species with the largest scutes and small dashes (lower left) those with the smallest. Abbreviations for species names: amba = *M.ambalavo*, andr = *M. andringitra*, fish = *M. fisheri*, good = *M. goodmani,* niki = *M. nikina*, rana = *M. ranavalona,* rano = *M. ranomafana*, toli = *M. toliara*, valt = *M. valterova*, vohi = *M. vohiparara*.

retroclaw, lacking teeth on median surfaces; tarsi I–IV lacking inferior claw (figs. 74–78); tarsal claws III, IV each with three modified clawlike setae (figs. 77, 78). Trichobothria examined with SEM: trichobothrial base longitudinally narrowed, aperture internal texture not gratelike; hood covered by numerous low closely spaced ridges, usually in transverse orientation but radially arranged in proximal half of some bothria; both types of ridges occur on tibial trichobothria (figs. 62–64). Tarsal organ with 2 sensilla on palp and tarsi III, IV; 3 sensilla on tarsi I, II (figs. 57–61). GENITALIA: Epigastric region with sperm pore small, rebordered (figs. 34–36). Palp (figs. 85–97,


Malagiella spp.
N
ranavalona
vohiparara
ranomafana
ambalavo
valterova
andringitra
nikina
toliara
goodmani
fisheri
45°

Map 1. The distribution of *Malagiella* species. Species placed in the *ranomafana* group are represented by boxes, the *vohiparara* group by circles, and the *toliara* group by triangles. The map of Madagascar showing the remaining primary vegetation is from Du Puy and Moat (2003). *Malagiella* species are mostly in the eastern evergreen forests, with two species located in the deciduous forests to the south and west.


Malagiella species groups
M. ranomafana
M. vohiparara
M. toliara
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niki
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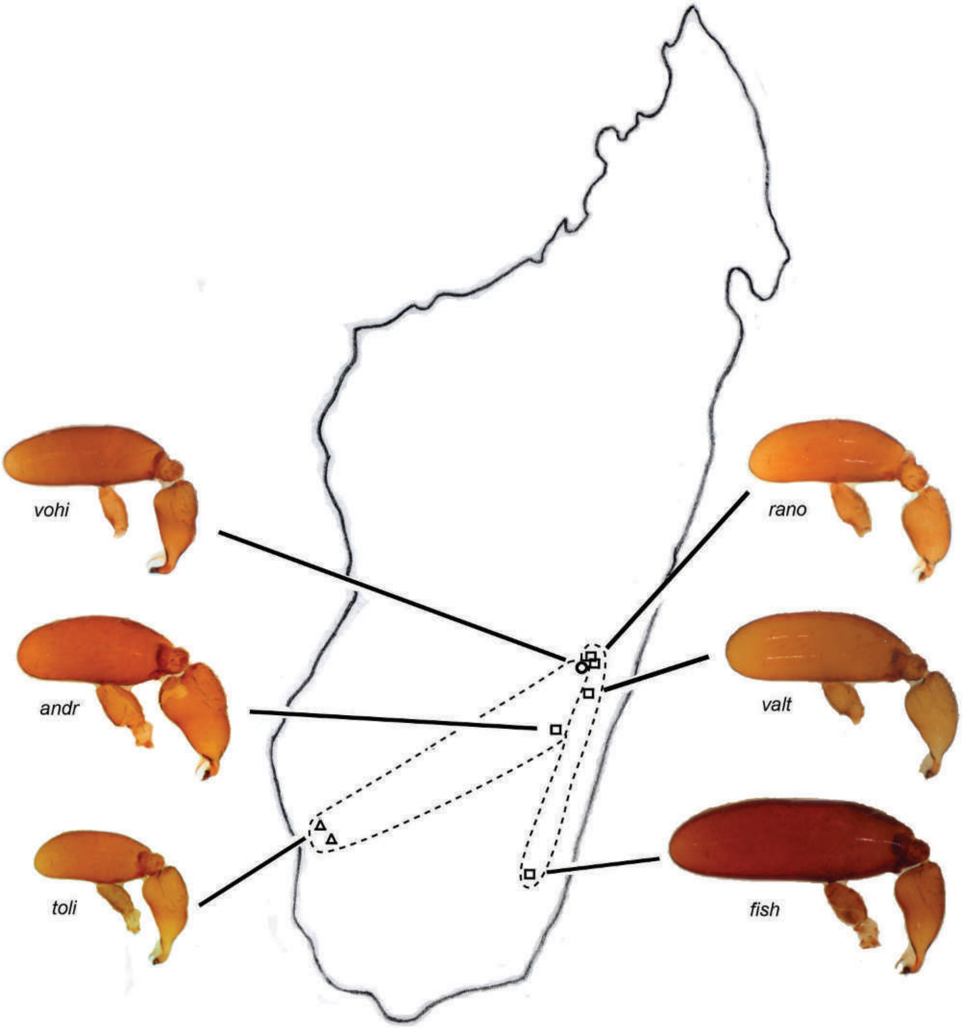
fish
good

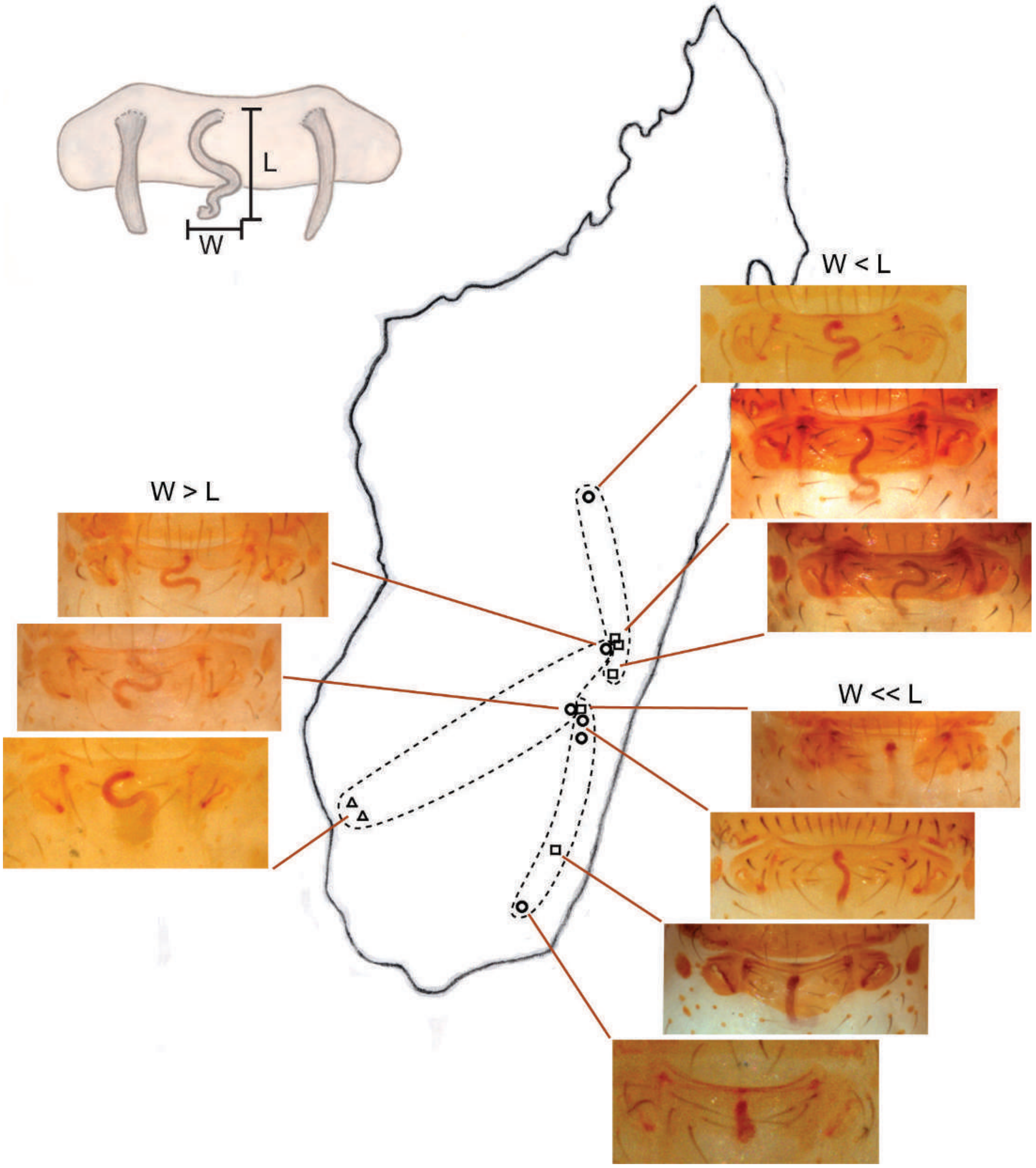
Map 2. Map of Madagascar showing the distribution of *Malagiella* species. *M. ranomafana* group (squares: rano = *M. ranomafana*, valt = *M. valterova*, andr = *M. andringitra*, fish = *M. fisheri*). *M. vohiparara* group (circles: rana = *M. ranavalona*, vohi = *M. vohiparara*, amba = *M.ambalavo* , niki = *M. nikina*, good = *M. goodmani*). *M. toliara* group (triangles: toli = *M. toliara*).



Map 3. Map of Madagascar showing the distribution of *Malagiella* palpi, imaged at same scale, with the dorsally indented bulbs on the left side and the unindented bulbs on right. Abbreviations: andr = *M. andringitra*, fish = *M. fisheri,* rano = *M. ranomafana*, toli = *M. toliara,* valt = *M. valterova*, vohi = *M. vohiparara.*

220–227, 481, map 3) bulb pale orange, more than 2 times as long as cymbium; embolar complex (figs. 93–97) distal, compressed, retrolaterally concave, with hyaline ventral prong (BVP) and dorsal embolus, apex transversely expanded with median opening and lateral prongs, prolateral prong (EPP) with groove connecting embolar opening (fig. 98).

FEMALE (PBI_OON 01999): Total length 1.71 (1.71–1.96), carapace length 0.82 (0.80–0.84), width 0.66 (0.64–0.68), N = 11. CEPHALOTHORAX: Clypeus shorter than eye region length (fig. 18), anteriorly narrowed to about 0.49 times its maximum width. Eyes (figs. 16–18, 215) as in male. Sternum microsculpture covering entire surface (figs. 21–23). Chelicerae (figs. 28, 29) and labium (fig. 29) as in male. Endites lacking anteromedian projection and anterolateral knob, three setae near serrula not stout (figs. 29, 30). ABDOMEN: Pedicel tube of medium length (fig. 218) and epigastric scutum dorsal extension (fig. 217), both



Map 4. Map of Madagascar showing the distribution of *Malagiella* epigynal types, with a grouping of species based on the degree of receptacular sinuosity. Diagram shows measurements used for determining receptacular width and length.

slightly shorter than in male. Dorsal scutum covering more than 0.7 of abdomen (figs. 211, 212), not fused to epigastric scutum (figs. 37, 38, 217, 218). Postepigastric scutum short, extending only to posterior spiracles, with small lateral sclerites, internally with short posteriorly directed lateral apodemes (figs. 108, 116, 213). Spinnerets: ALS with three spigots, median slightly larger; PMS with three subequal spigots; PLS with six subequal spigots (figs. 44–47). LEGS (figs. 466, 467): With fine transverse ridges delineating regions of muscle attachment (figs. 54, 55) and slit sensilla (figs. 51–53).

Tarsal claws as in male except: tarsus IV superior claws with three teeth on lateral surfaces and one large apical tooth on median surfaces of both proclaw and retroclaw (figs. 79–84). Trichobothria (figs. 70–73) as in male. Tarsal organ (figs. 65–69) as in male. GENITALIA: Ventral view (figs. 100–107, 228–234, map 4): epigynal area with median depression enclosing small round hole (copulatory opening) (figs. 101, 103, 105), with a pair of slitlike openings at base of apodemes (fig. 104), with sigmoid tube (receptaculum) and a pair of paramedian apodemes visible through cuticle (figs. 228, 234). Dorsal view (figs. 108–116, 235): receptaculum sigmoid, reaching posteriorly slightly beyond postepigastric scutum; with pair of lateral apodemes. The receptaculum varies considerably in size, degree of sinuation, and direction of curvature (figs. 228–235).

Other Material Examined: MADAGASCAR: Fianarantsoa Province: Ranomafana N.P., 21°12′S, 47°27′E, forest, 1–30 Apr 1992 (V. Roth, B. Roth, S. Kariko, CASENT 9029651, PBI_OON 03231), 1♀; Ranomafana N.P., Maharira, 09 Apr 1992 (Emile, Kariko-Roth Coll., MCZ 53653, MCZ 53656, PBI_OON 00028216, PBI_OON 00028217), 2♀; Trail F, 325 m, 18 May 1992 (Emile, Kariko-Roth Coll., MCZ 53652, PBI_OON 00028212), 1♀; Trail L, 1050 m, 15 Apr 1992 (Emile, Kariko-Roth Coll., MCZ 53626, PBI_OON 00028214), 2♀; Trail M, 15 May 1992 (Albert, Kariko-Roth Coll., MCZ 53657, PBI_OON 00028215), 1♀; across footbridge at campsite, 26 Mar 1992 (S. Kariko, V. Roth, MCZ 53646, PBI_OON 00028213) 6♀; Talatakely, P.N. Ranomafana, 21°14.9′S, 47°25.6′E, sifting leaf litter, 5–18 Apr 1998 (C. Griswold, D. Ubick, CASENT 9029647, PBI_OON 03227), 1♂, 2♀; 19–30 Apr 1998 (C. Griswold, D. Ubick, CASENT 9029649, PBI_OON 03229), 1♀; pitfall trap, 13–27 Apr 1998 (Griswold et al., CASENT 9029650, PBI_OON 03230), 1♂; 21°15.3′S, 47°25.9′E, pitfall trap, 9–26 Apr 1998 (Griswold et al., CASENT 9029644, PBI_OON 03224), 2♂, 3♀; 21°15′S, 47°26′E, 915–1000 m, 30 Oct–20 Nov 1998 (V. Lee, K. Ribardo, CASENT 9029648, PBI_OON 03228), 1♂; 21°15.8′S, 47°25.2′E, 940–985 m, pitfall trap, 1–21 Nov 1998 (V. Lee, K. Ribardo, CASENT 9029646, PBI_OON 03226), 1♂; 21°15.5′S, 47°25.4 E, 1050 m, montane rainforest, 24 Dec 2005–14 Jan 2006 (H. Wood, J. Miller, et al., HW009, CASENT 9019096, PBI_OON 03433), 2♂, 2♀; Vatoharanana 1100, −21.29, 47.43333, 1100 m, montane rainforest, pitfall trap, 27–31 Mar 2003 (Fisher, Griswold et al., BLF8402, CASENT 9011546, PBI_OON 03232), 2♂, 1♀; sifted litter, leaf mold, rotten wood, 27–31 Mar 2003 (Fisher, Griswold et al., BLF8400, CASENT 9011421, PBI_OON 02216), 1♀; Vatoharanana 1200, 21°16.7′S, 47°26.1′E, 1200 m, primary rainforest understory, 15–29 Apr 1998 (Griswold et al., CASENT 9025683, PBI_OON 01999), 4♂, 3♀; sifting leaf litter, 15 Apr 1998 (C. Griswold, D. Ubick, CASENT 9029652, PBI_OON 03233), 1♀; 7 km SW Ranomafana, 21.12°N, 47.27°E, 1000 m, 20–24 Mar 1990 (W. Steiner, USNM, PBI_OON 00027793), 1♀.

Distribution: Known only from Ranomafana National Park, Madagascar.

Malagiella valterova, new species

Figures 236–267, 473, 483, 487; maps 1–4; table 1

Type: Male holotype and female allotype from sifted litter along Tatamaly River, 21°30′42″S, 47°24′36″E, 1075 m, 2 km W Andrambovato, Fianarantsoa Province, Madagascar (3–5 Jun 2005, B. Fisher), deposited in CAS (CASENT 9030812, PBI_OON 03461).

Etymology: This species is named after Darrell Ubick's late father, "Valter" Ubick, in remembrance of many years of companionship, and is given in Croatian genitive.

Diagnosis: The male of this species most closely resembles *M. ranomafana*, from which it differs by its longer palpal patella and bulb-cymbium (fig. 483), and by the slightly longer ventral abdominal scute (fig. 239). The female differs from others in the group in having a widely sinuous receptaculum, W/L ca. 0.7 (figs. 264–267).

Male (PBI_OON 03461): Total length 1.55, carapace length 0.78, width 0.62. CEPHALOTHORAX: Carapace as in *M. ranomafana* (figs. 237, 238, 241, 242). Clypeus as in *M. ranomafana*, but slightly longer (figs. 238, 241). Eyes as in *M. ranomafana*, eye area width 0.5 carapace width; length subequal to clypeus length. Sternum as in *M. ranomafana* (figs. 240, 473). ABDOMEN (figs. 239, 243–245) as in *M. ranomafana*. ABDOMEN: Ventral scute (fig. 239) slightly longer than in *M. ranomafana.* GENITALIA: Epigastric region with sperm pore small, rebordered (fig. 263). Palp (figs. 256–262, 483) slightly larger than in *M. ranomafana.*

FEMALE (PBI_OON 03461): Total length 1.70, carapace length 0.80, width 0.66. CEPHALOTHORAX (figs. 246–248, 251, 252): Clypeus shorter than eye region length (fig. 248). Eye area 1.6 clypeus length (figs. 247, 248, 251). ABDOMEN (figs. 249, 253–255): Dorsal scutum slightly longer than in *M. ranomafana.* GENITALIA: Ventral view: receptaculum slender and strongly sinuous, W/L about 0.7 (figs. 264–267, map 4).

OTHER MATERIAL EXAMINED: None.

DISTRIBUTION: Known only from the type locality.

Malagiella andringitra, new species
Figures 268–300, 472, 482, 487; maps 1–4; table 1

TYPE: Male holotype and female allotype sifted from leaf litter in rainforest, 38 km S Ambalavo, 22°12′S, 46°58′E, 1680 m, Res. Andringitra, Fianarantsoa Province, Madagascar (23 Oct 1993, B. Fisher), deposited in CAS (♂ holotype: CASENT 9029653, PBI_OON 03234; ♀ allotype CASENT 9029669, PBI_OON 03376).

ETYMOLOGY: The species is named after the type locality.

DIAGNOSIS: The male differs from others in the group by the large bulb-cymbium (about 0.7 patella-tibia length; but about 0.5 in other species) and the presence of a shallow dorsal groove proximally on the bulb (fig. 482). The female differs in having a smaller dorsal scute (fig. 279) and the epigynal region weakly sclerotized and the receptaculum short and relatively straight (W/L about 0.25) (figs. 296, 297).

MALE (PBI_OON 03234). Total length 1.53, carapace length 0.74, width 0.62. CEPHALOTHORAX: Carapace (figs. 269, 270, 274) as in *M. ranomafana*. Eyes as in *M. ranomafana*, but slightly smaller; eye area about 0.5 carapace width, length subequal to clypeus length (figs. 269, 273). Sternum (figs. 272, 472) as in *M. ranomafana*. ABDOMEN (figs. 269, 271, 275–277) as in *M. valterova*, but with slightly smaller book lung covers. GENITALIA: Epigastric region with sperm pore small, rebordered (fig. 271). Palp with bulb-cymbium large, about 0.7 patella-tibia length; bulb with dorsal depression (figs. 288–295, 482, map 3).

FEMALE (PBI_OON 03376). Total length 1.82 (1.80–1.82), carapace length 0.78, width 0.68 (0.66–0.68), N = 2. CEPHALOTHORAX (figs. 278–280, 283, 284): Clypeus sloping forward in lateral view, shorter than eye row length (fig. 280). Eye area about 1.3 clypeus length (figs. 280, 283). ABDOMEN (figs. 281, 285–287): Pedicel tube short (fig. 286), scutum dorsal extension slightly less than pedicel diameter (fig. 286). Dorsal scutum smaller than carapace, covering about 0.6 abdomen length and width (fig. 279). Postepigastric scutum weakly sclerotized. LEGS: patella plus tibia I longer than carapace (fig. 280). GENITALIA: Epigynal region weakly sclerotized, receptaculum short and relatively straight, W/L about 0.25 (figs. 296–300, map 4).

OTHER MATERIAL EXAMINED: MADAGASCAR: Fianarantsoa Province: Res. Andringitra, 38 km S Ambalavo, 22°12′S, 46°58′E, 1680 m, rainforest, sifting leaf litter, 23 Oct 1993 (B. Fisher, CASENT 9029654, PBI_OON 03375), 1♀.

DISTRIBUTION: Known only from the type locality in Res. Andringitra, Madagascar.

Malagiella fisheri, new species
Figures 301–328, 474, 485, 487; maps 1–4; table 1

TYPE: Male holotype and female allotype from sifting leaf litter in rainforest, at 28.5 km S Midongy-Sud, Mount Papango, 23°50.1′S, 46°57.8′E, 940 m, P.N. Befotaka-Midongy, Fianarantsoa Province, Madagascar (13–15 Nov 2006, Fisher et al.), deposited in CAS (CASENT 9030777, PBI_OON 03452).

ETYMOLOGY: This species is named after Brian Fisher, collector of this and several other species of *Malagiella*, in honor of his impressive sampling program of the Malagasy fauna.

DIAGNOSIS: The male of this species differs from other *Malagiella* in lacking sternal bristles (fig. 474) and in having a huge palpal patella (figs. 321–324, 485). The female differs from others in having a distinctly procurved posterior margin of the PES (figs. 327, 328) and a slightly curved receptaculum (W/L about 0.3).

MALE (PBI_OON 03452): Total length 1.62, carapace length 0.82, width 0.69. CEPHALOTHORAX: Eye area about 0.5 carapace width; subequal to clypeus length (figs. 302, 303, 306). Sternum lacking stiff bristles found in other species (figs. 305, 474), median concavity absent. ABDOMEN (figs. 304, 308–310): as in *M. valterova*. GENITALIA (figs. 321–326): Palp with patella greatly enlarged (fig. 485), about five times femur length, but less than four times in other species (figs. 481–484, 485).

FEMALE (PBI_OON 03452): Total length 1.70 (1.70–1.86), carapace length 0.80 (0.78–0.80), width 0.70 (0.68–0.70), N = 2. CEPHALOTHORAX (figs. 311–313): Clypeus shorter than eye region length. Eye area about 1.8 clypeus length (fig. 313). ABDOMEN (figs. 314, 318–320): Pedicel tube (fig. 337) shorter than in male. GENITALIA: Postepigastric scutum with posterior margin procurved, receptaculum only slightly curved, W/L about 0.3 (figs. 327, 328).

OTHER MATERIAL EXAMINED: MADAGASCAR: Fianarantsoa Province: P.N. Befotaka-Midongy, Papango 27.7 km S Midongy-Sud, Mount Papango, 23°50.5′S, 46°57.5′E, 1250 m, montane rainforest, sifting leaf litter, 17–19 Nov 2006 (B. Fisher et al., CASENT 9030776, PBI_OON 03442), 1♀.

DISTRIBUTION: Known only from P.N. Befotaka-Midongy, Madagascar.

Malagiella vohiparara species group

DIAGNOSIS: Members of this group differ from those of the *ranomafana* group in being smaller, light brown species, with reduced carapace reticulation (figs. 117–124). Eyes are typically smaller, although somewhat larger in *M. nikina* (figs. 394, 398), with eye area width usually less than 0.4 cephalon width (figs. 120, 124) and eye area length about 0.5 clypeus length in males (figs. 117, 119, 347) or subequal to greater than clypeus length in females (figs. 121, 123, 360). Male abdomen with dorsal and ventral scutes narrow (figs. 145, 352), with contact zone rounded (figs. 142–146). Both males and females differ from the somatically similar *toliara* group in lacking lateral spines on hind tibiae and metatarsi and from the *ranomafana* group in having the tibia IV with a pair of ventroapical spines (fig. 469).

SPECIES INCLUDED: *Malagiella ambalavo, M. goodmani, M. nikina, M. ranavalona,* and *M. vohiparara.*

Malagiella ranavalona, new species

Figures 329–344, 487, maps 1, 2, 4; table 1

TYPE: Female holotype from forêt autour du Palais de la Reine Ranavalona, env., Ambohimanga, 20 km N Antananarivo, 1400 m, Antananarivo Province, Madagascar (9 Dec 1989, B. Hauser), deposited in NHMB (Bern-Mad-89/59, PBI_OON 03637).

ETYMOLOGY: The species is named after the type locality.

DIAGNOSIS: This species differs from others in the group by the moderately sinuous receptaculum, W/L = 0.76 (figs. 339–344).

MALE: Unknown.

FEMALE (PBI_OON 03637): Total length 1.61 (1.50–1.61), carapace length 0.60, width 0.49, N = 2. CEPHALOTHORAX (figs. 329–331, 333–335): Eyes small, subequal; eye area about 0.40 carapace width, subequal to clypeus length (figs. 331, 334). ABDOMEN (figs. 332, 336–338): Pedicel tube short (fig. 337), scutum dorsal extension short, about 0.3 pedicel diameters. Dorsal scutum weakly sclerotized, pale orange, covering about 0.5 abdomen length, 0.3 abdomen width (fig. 330). LEGS: Patella plus tibia I nearly as long as carapace. Leg spination (in addition to typical pattern): tibia IV v0-0-2. GENITALIA: Postepigastric scutum weakly sclerotized; receptaculum moderately sinuous, W/L = 0.76 (figs. 341–344).

OTHER MATERIAL EXAMINED: MADAGASCAR: Antananarivo Province: Ambohimanga, 20 km N Antananarivo, forêt autour du Palais de la Reine Ranavalona, env., 1400 m, 9 Dec 1989 (C. Lienhard, NHMB Bern-Mad-89/60, PBI_OON 03919), 1♀.

DISTRIBUTION: Known only from the type locality in central Madagascar.

Malagiella vohiparara, new species

Figures 117–184, 345–378, 464, 468, 469, 476, 479, 484, 487; maps 1–4; table 1

TYPE: Male holotype, female allotype, male paratype, and 3 female paratypes from sifted leaf litter at P.N. Ranomafana, 2.3 km N Vohiparara, 21°12.8′S, 47°23.0′E, 1100 m, Fianarantsoa Province, Madagascar (28 Apr 1998, C. Griswold, D. Ubick), deposited in CAS (CASENT 9029655, PBI_OON 03078).

ETYMOLOGY: The species is named after the type locality.

DIAGNOSIS: The male of this species differs from other *Malagiella* by the combination of small size and the absence of lateral spines on the hind legs. The female differs from others in its species group in having a widely sinuous receptaculum, W/L = 1.0–1.2 (figs. 182–184, 375–378; map 4).

MALE (PBI_OON 03078) (figs. 117–120, 125–128, 133–139, 142–152, 157–172, 345–354, 365–372, 476, 484; map 3): Total length 1.32 (1.26–1.32), carapace length 0.64 (0.60–0.66), width 0.55 (0.52–0.56), N = 9. CEPHALOTHORAX: Carapace orange-brown, broadly oval in dorsal view, pars cephalica strongly elevated in lateral view (figs. 117, 347), anteriorly narrowed to about 0.64 times its maximum width, surface and sides of elevated portion of pars cephalica finely reticulate (fig. 118); lateral margin undulate, smooth; nonmarginal pars cephalica setae dark, present in U-shaped row (figs. 117–120). Clypeus length more than twice eye area length (fig. 117). Eyes medium sized, eye area width 0.36 carapace width, length 0.45 clypeus length (figs. 117, 120). Sternum infracoxal groove with opening only at posterior end (fig. 125) with median longitudinal groove weakly represented (fig. 126); sternal bristles long, straight (fig. 125). Mouthparts: Chelicerae with promarginal tooth and patch of largely retromarginal denticles (figs. 135, 136). Endites distally excavated, serrula present in single row (fig. 128); distomedian part with projection bearing dense scopula (fig. 127), distolateral part with swelling bearing serrula and three stout setae (figs. 127, 128). ABDOMEN: Cylindrical, slightly compressed (figs. 352, 354). Book lung covers large, ovoid (fig. 370). Dorsal scutum strongly sclerotized, narrowed to 0.6 carapace width; fusion with epigastric scutum a rounded junction (figs. 142–144). Postepigastric scutum broadly rounded, extending to about 0.6 abdomen length. Spinnerets (fig. 149): ALS with three spigots (fig. 150), PMS with two spigots (fig. 151), PLS with three spigots (fig. 152). LEGS: Spination: femur I p0-1-0; tibiae: I v4-4-0, II v4-2-1, IV v0-0-2 (weak). GENITALIA: Epigastric region with sperm pore small, unmodified (fig. 148). Palpal bulb with dorsobasal indentation (figs. 157, 158, 365, 366, 371, 372), embolus sharply bent ventrally (figs. 159, 160); ventral prong long (fig. 169); embolar opening small (fig. 170), closer to retrolateral prong (fig. 172).

FEMALE (PBI_OON 03078) (figs. 121–124, 129–132, 140–141, 153–156, 173–184, 355–364, 373–378, 464, 468, 469, 479; map 1, 2, 4): Total length 1.36 (1.36–1.48), carapace length 0.66 (0.66–0.70), width 0.58 (0.55–0.59), N = 4. CEPHALOTHORAX: Carapace similar to male but with lower cephalon, much shorter clypeus (figs. 121–124), and anteriorly narrowed to about 0.46 maximum width (fig. 124). Eyes medium sized; eye area about 0.45 carapace width, length 0.5 clypeus length (figs. 121, 124). Sternum with infracoxal groove opening only at posterior end (fig. 130). Mouthparts: endites without distal modifications (fig. 132). ABDOMEN: Pedicel tube short (fig. 363); scutum dorsal extension shorter than in male, about 0.4 pedicel diameters (fig. 362). Dorsal scutum covering about 0.7 abdomen length, 0.5 abdomen width. Spinnerets (fig. 153): ALS with three spigots (fig. 154), PMS with three spigots (fig. 155), PLS with five spigots (fig. 156). LEGS: Spination as in male (figs. 468, 469). GENITALIA: Postepigastric scutum weakly sclerotized, externally with round copulatory opening (figs. 176, 177), receptaculum strongly sinuous, W/L = 1.0–1.2 (figs. 182–184, 375–378; map 4), enclosed in chitinized membrane (figs. 179–181), rigidly attached to postepigastric scutum (figs. 182–184).

OTHER MATERIAL EXAMINED: MADAGASCAR: Fianarantsoa Province: Talatakely, P.N. Ranomafana, 21°14.9′S, 47°25.6′E, pitfall trap, 13–27 Apr 1998 (Griswold et al., CASENT 9029666, PBI_OON 03380), 2♂; P.N. Ranomafana, 2.3 km N Vohiparara, 21°12.8′S, 47°23.0′E, 1100 m, 18 Apr 1998 (Griswold et al., CASENT 9029665, PBI_OON 03381), 1♂; pitfall trap, 10–28 Apr 1998 (Griswold et al., CASENT 9029668, PBI_OON 03378), 5♂; sifting leaf litter, 18 Apr 1998 (C. Griswold, D. Ubick, CASENT 9029664, PBI_OON 03382), 2♀; 11 Apr 1998 (C. Griswold, D. Ubick (CASENT 9029667, PBI_OON 03379), 1♀; Vohiparara, 3.6 km W Ranomafana, 21°14.243′S, 47°23.842′E, 1137 m, evergreen secondary forest, sifting litter, 13 Jan 2009 (D. Andriamalala, C. Griswold, G. Hormiga, A. Saucedo, N. Scharff, H. Wood, AMNH, PBI_OON 35162), 1♀; same data (AMNH, PBI_OON 35163), 1♂1♀.

DISTRIBUTION: Known only from P.N. Ranomafana, Madagascar.

Malagiella ambalavo, new species

Figures 379–392, 487; maps 1, 2, 4; table 1

TYPE: Female holotype from sifted litter in rainforest, at 40 km S Ambalavo, 22°13′S, 46°58′E, 1275 m, Res. Andringitra, Fianarantsoa Province, Madagascar (15 Oct 1993, B. Fisher), deposited in CAS (CASENT 9029657, PBI_OON 03223).

ETYMOLOGY: The species is named after the type locality.

DIAGNOSIS: This species is most similar to *M. vohiparara*, but differs in being slightly smaller, having reduced eyes (fig. 384) and a less sinuous receptaculum, W/L = 0.9 (figs. 389–392).

MALE: Unknown.

FEMALE (PBI_OON 03223): Total length 1.41, carapace length 0.68, width 0.54. CEPHALOTHORAX: Carapace anteriorly narrowed to about 0.47 times its maximum width (fig. 380), surface of elevated portion of pars cephalica smooth, sides smooth (fig. 381). Clypeus sloping forward in lateral view, subequal to eye area length (fig. 382). Eyes small, PME reduced and irregular, difficult to see; eye row width 0.43 carapace width; length 0.93 clypeus length (figs. 380, 384). ABDOMEN: Book lung covers ovoid (fig. 386). Pedicel tube short (fig. 387), scutum dorsal extension about 0.2 pedicel diameters (fig. 404). Dorsal scutum covering about 0.75 abdomen length, about 0.5 abdomen width (fig. 380). Dense patch of setae anterior to spinnerets present, but weak (fig. 382). LEGS: Pale orange; patella plus tibia I nearly as long as carapace (fig. 381). Leg spination: femur I p0-1-0; tibiae: I v4-4-0, II v4-2-0, IV v0-0-2 (weak). GENITALIA: Receptaculum strongly sinuous, W/L = 0.9 (figs. 389–392).

OTHER MATERIAL EXAMINED: None.

DISTRIBUTION: Known only from the type locality, Res. Andringitra, Madagascar.

Malagiella nikina, new species

Figures 393–410, 487; maps 1, 2, 4; table 1

TYPE: Female holotype from sifted litter in rainforest, 43 km S Ambalavo, 22°14′S, 47°00′E, 825 m, Massif Andringitra, Fianarantsoa Province, Madagascar (4 Oct 1993, B. Fisher), deposited in CAS (CASENT 9029662, PBI_OON 03384).

ETYMOLOGY: This species is named for Darrell Ubick's mother, Nikie Ubick, for maintaining cultural ties, and is given in Croatian genitive.

DIAGNOSIS: This species resembles *M. vohiparara*, from which it differs in being slightly larger, and having a longer dorsal scute (fig. 401), larger eyes (fig. 394), and a less sinuous receptaculum, W/L = 0.2–0.4 (figs. 403–410, map 4).

MALE. Unknown.

FEMALE (PBI_OON 3386): Total length 1.48 (1.48–1.64), carapace length 0.74 (0.64–0.74), width 0.60 (0.56–0.62), N = 4. CEPHALOTHORAX (figs. 393–395, 398, 399): Carapace anteriorly narrowed to about 0.49 times its maximum width, surface and sides of elevated portion of pars cephalica finely reticulate (figs. 394, 395, 398, 399). Clypeus subequal to eye area length (fig. 395). Eyes well developed, medium large; eye area width 0.43 carapace width, length 1.5 clypeus length (figs. 394, 398). ABDOMEN (figs. 396, 400–402): Pedicel tube short (fig. 401), scutum dorsal extension about 0.45 pedicel diameter (fig. 400). Dorsal scutum strongly sclerotized; covering 0.6–0.8 abdomen length (figs. 394, 401), 0.5–0.7 abdomen width (figs. 394, 400). Dense patch of setae anterior to spinnerets present, but weak (fig. 396). LEGS: Spines (in addition to typical pattern) tibia IV v0-0-2, spines weak, shorter than segment length. GENITALIA: Postepigastric scutum weakly sclerotized, receptaculum slightly sinuous, W/L = 0.2–0.4 (figs. 403–410, map 4).

OTHER MATERIAL EXAMINED: MADAGASCAR: Fianarantsoa Province: Massif Andringitra, 43 km S Ambalavo, 22°14′S, 47°00′E, 825 m, rainforest, sifted litter, 4 Oct 1993 (B. Fisher, CASENT 9029660, PBI_OON 03386), 1♀; (PBI_OON 03385, CASENT 9029661), 1♀; 8.0 km NE Ivohibe, 22°25.3′S, 46°53.9′E, 1200 m, forest, pitfall trap, 3–9 Nov 1997 (B. Fisher, CASENT 9029663, PBI_OON 03383), 1♀.

DISTRIBUTION: Known only from the two localities in the vicinity of Andringitra, Madagascar.

Malagiella goodmani, new species

Figures 411–428, 487; maps 1, 2, 4; table 1

TYPE: Female holotype from 15 km NW Eminiminy, 24°34.2′S, 46°43.9′E, 1500 m, Toliara Province, Madagascar (17–27 Nov 1995, S. Goodman), deposited in FMNH (FMNH-INS 0000 033 748, PBI_OON 03920).

ETYMOLOGY: This species is named after Steve Goodman, collector of the species, in honor of his work on the Malagasy biota.

DIAGNOSIS: This species may be distinguished from others in the group by the short and straight receptaculum, with W/L about 0.3 (figs. 423–428).

MALE: Unknown.

FEMALE (PBI_OON 10247): Total length 1.48 (1.40–1.48), carapace length 0.64 (0.63–0.64), width 0.54 (0.52–0.54), N = 2. CEPHALOTHORAX: Carapace anteriorly narrowed to 0.49 times its maximum width (fig. 412), surface and sides of elevated portion of pars cephalica finely reticulate (figs. 412, 413, 416, 417). Clypeus subequal to eye area length (fig. 413). Eyes well developed, medium sized; eye row width 0.45 carapace width; length 1.1 clypeus length (figs. 412, 413, 416). ABDOMEN: Pedicel tube short (fig. 419), scutum dorsal extension about 0.25 pedicel diameter (fig. 418). Dorsal scutum covering about 0.7 abdomen length, 0.45 abdomen width (fig. 412). GENITALIA: Postepigastric scutum weakly sclerotized, receptaculum broad and straight (figs. 423–428).

OTHER MATERIAL EXAMINED: MADAGASCAR: Toliara Province: R.N.I. d'Andohahela, parcel 1, 8 km NW Eminiminy, 24°37.6′S, 46°45.9′E, 440 m, 19–28 Oct 1995 (S. Goodman, FMNH-INS 0000 033 745, PBI_OON 10247), 1♀.

DISTRIBUTION: Known only from R.N.I. d'Andohahela, Madagascar.

Malagiella toliara species group

DIAGNOSIS: Members of this group are easily recognized by the extremely small size (figs. 431, 442), pale coloration, and the presence of lateral spines on hind tibiae and metatarsi (fig. 471). Eyes are small, with eye row width less than 0.4 cephalon width (fig. 430) and eye row length about one-half clypeus length in the male (fig. 435) or subequal to clypeus length in the female (fig. 445). Male abdomen with dorsal and ventral scutes very narrow, contact zone at fusion broadly rounded (figs. 432, 433, 438), and sperm pore large (fig. 432).

SPECIES INCLUDED: *Malagiella toliara.*

Malagiella toliara, new species

Figures 185–199, 429–462, 465, 470, 471, 477, 480, 486, 487; maps 1–4; table 1

TYPE: Male holotype and female allotype from sifted litter, leaf mold, rotten wood, in gallery forest, at Andranomite, 23.5242° S, 44.12133° E, 75 m, Toliara Province, Madagascar (27 Feb–3 Mar 2002, Fisher-Griswold Arthropod Team), deposited in CAS (BLF5850, CASENT 9010327, PBI_OON 03221).

ETYMOLOGY: The species name refers to its distribution.

DIAGNOSIS: This species can be distinguished from other *Malagiella* by its small size (males = 1.1, with >1.2 in other species; females = 1.3, with ≥ 1.4 in other species) (figs. 431, 442), pale coloration, small eyes (figs. 435, 445), and the apparent absence of carapace sculpturing (figs. 430, 441). The female has a narrow DS (0.25 abdomen width (fig. 441), which is > 0.30 in other species) and widely sinuous epigynal ducts, with W = L (figs. 458–462). The male has a short VS, with distance from sperm pore to posterior edge being much shorter than to anterior edge (fig. 432) and a short palpal patella (patella-tibia L/cymbium-bulb L = 1.3 (figs. 450–453), which is 1.5–2.2 in other species).

MALE (PBI_OON 03221): Total length 1.12 (1.10–1.12), carapace length 0.60, width 0.44 (0.44–0.46), N = 2. CEPHALOTHORAX: Carapace pale orange, elongate oval in dorsal view (fig. 430), pars cephalica slightly elevated in lateral view, anteriorly narrowed to about 0.5 times its maximum width (fig. 430), surface of elevated portion of pars cephalica smooth, sides smooth (fig. 431); lateral margin straight; nonmarginal pars cephalica setae present in U-shaped row (setae rubbed off of available specimens, but bases visible). Clypeus twice the length of eye area. Eyes well developed, small; eye row width 0.26 carapace width, length 0.6 clypeus length (figs. 430, 435). Sternum with long bristles (figs. 434, 477). ABDOMEN: Shape cylindrical, somewhat compressed (figs. 432, 433, 437–439), strongly overhanging cephalothorax (fig. 431). Book lung covers large, ovoid (fig. 438). Pedicel tube short (fig. 438), scutum dorsal extension about 1.6 pedicel diameter. Dorsal scutum weakly sclerotized, pale orange, covering about 0.5 abdomen length and about 0.5 abdomen width (fig. 433). Postepigastric scutum short, covering (together with epigastric scutum) about 0.6 abdomen length, fused to epigastric scutum (figs. 432, 438). LEGS: Spination: femur I p0-1-0; tibiae: I, II v4-4-0, IV p1-1-0, r1-1-0, v0-0-2; metatarsi: I, II v2-2-0, III p0-1-0, r0-1-0, IV p1-0-0, r1-1-0. GENITALIA: Epigastric region with sperm pore large (fig. 432). Palpal patella 3.0 times femur length (figs. 450–457, 486, map 3), tarsus seamlessly fused to bulb (figs. 191, 192), bulb with dorsobasal indentation (figs. 185–188, 450, 451), bulb-cymbium about 0.7 tibia-patella length; embolus less sharply bent ventrally (figs. 185, 486), embolar opening small (fig. 192), closer to retrolateral prong (fig. 193).

FEMALE (PBI_OON 03221): Total length 1.34, carapace length 0.60, width 0.46. CEPHALOTHORAX: Carapace elongate oval in dorsal view, anteriorly narrowed to about 0.45 times its maximum width (fig. 441). Clypeus subequal to eye area length. Eyes small: eye row width 0.33 carapace width (fig. 445); length 1.1 clypeus length (figs. 441, 442). Female palp spines absent (figs. 465, 480). ABDOMEN: Pedicel tube short (fig. 448), scutum dorsal extension about 0.2 pedicel diameter (fig. 447). Dorsal scutum covering about 0.7 abdomen length, about 0.25 abdomen width (fig. 441). Dense patch of setae anterior to spinnerets present (fig. 448). LEGS: Spination: femur I p0-1-0; tibiae: I, II v4-2-2, IV pv0-0-1; metatarsi: I, II v2-2-0, III p0-1-0, r0-1-0, IV p1-1-0, r0-1-0 (figs. 470, 471). GENITALIA: Postepigastric scutum weakly sclerotized (fig. 443). Receptaculum strongly sinuous, W = L (figs. 458–461).

OTHER MATERIAL EXAMINED: MADAGASCAR: Toliara Province: Fiherenana MGF040, 23.1769° S, 43.96083° E, 100 m, gallery forest, sifted litter, leaf mold, rotten wood, 21–24 Oct 2002 (Frontier Project, MGF040, CASENT 9011402, PBI_OON 03377), 1♂.

DISTRIBUTION: Known only from two localities in southwestern Toliara Province, Madagascar.

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INDEX OF SPECIFIC NAMES

ambalavo, Malagiella, 10, 82
andringitra, Malagiella, 9, 79
cubanus, Oonops, 5
fisheri, Malagiella, 10, 79
goodmani, Malagiella, 7, 83
key to *Malagiella* species, 54
nikina, Malagiella, 10, 82
paquini, Camptoscaphiella, 4
peltifer, Ischnothyreus, 8
ranavalona, Malagiella, 10, 80
ranomafana, Malagiella, 5, 59
toliara, Malagiella, 8, 83
tubulatus, Oonops, 5
valterova, Malagiella, 10, 78
vohiparara, Malagiella, 7, 81